GRADUATE WORKSHOP FOR INDUSTRIAL ARTS TEACHERS OF THE BLIND

CONDUCTED AT STATE UNIVERSITY COLLEGE OF NEW YORK, COLLEGE OF EDUCATION AT OSWEGO, JULY 5-AUGUST 12, 1960

GRADUATE WORKSHOP

FOR

INDUSTRIAL ARTS TEACHERS

OF THE BLIND

Conducted at

State University of New York

College of Education at Oswego

July 5 - August 12, 1960

A summary report submitted to the Office of Vocational Rehabilitation of the United States Office of Health Education and Welfare.

Report Prepared by:

Dr. James R. Hastings
Professor of Industrial Arts
State University College of
Education at Oswego

CONTENTS

Page

Introduction

The six week experimental summer workshop program conducted at State University College of Education at Oswego which this report covers represents the third phase of a long range project sponsored jointly by the Office of Vocational Rehabilitation of the United States Office of Health, Education and Welfare, the American Foundation for the Blind and The American Association of Instructors of the Blind.

At the request of the AAIB, the American Foundation for the Blind in 1959 conducted an extensive survey of industrial arts facilities and practices in a representative number of public and residential schools where industrial arts was being taught to blind students. As a result of this survey it was deemed necessary to develop a curriculum guide of principles and standards to serve as a guide for the teaching of industrial arts to blind students.

A conference of selected personnel was held in February 1959 to develop the bulletin Industrial Arts for Blind Students covering four major areas of industrial arts education. This bulletin represents the second phase of the project and has served a most valuable purpose in providing a common statement of philosophy and purpose for industrial arts instructors who were to be enrolled in the summer workshops to be conducted at Oswego and for other industrial arts instructors throughout the country engaged in teaching blind students.

In order to implement properly the basic philosophy and practices expressed in the bulletin and to improve practices which were shown to need improvement by the survey, it was deemed necessary by the AAIB and AFB to conduct a series of summer workshops to provide in-service training for industrial arts instructors of blind students to acquaint them with the most current practices in industrial arts education. In view of the increasing number of blind students who will need to be educated in public school programs it was deemed advisable to make

the summer workshops available to public school industrial arts instructors who are teaching blind students to make these teachers more fully aware of the blind student and to become familiar with the proper techniques for teaching them.

At the request of the American Foundation for the Blind the State University College of Education at Oswego made application to the Office of Vocational Rehabilitation for financial support under section 4 of the Vocational Rehabilitation Act to carry out a training course for industrial arts instructors teaching blind students for the purpose of improving industrial arts training in technical matters relating to vocational preparation of pupils so as to better equip them to profit from Vocational Rehabilitation Services.

It was also recognized that the teaching and activities in industrial arts departments in residential schools should be at least equal to the standard of that for sighted pupils in public school systems. Since there appears to be a serious discrepancy between the experiences provided for sighted and blind students in the area of industrial arts, it is believed that a workshop of this kind and the resultant report showing the type of work which blind students are capable of performing would make a significant contribution to the up-grading of standards.

To achieve these purposes the State University College of Education at Oswego proposed the following program:

1. Initiate and carry out a plan of graduate studies arranged with both laboratory and professional experiences providing the core of the program as follows:

   a. Special Education Laboratory - Experiences to be provided to develop technical abilities with emphasis in wood, metal, transportation, and electricity as related to the teaching of blind students

b. Experimental Special Education Activities Laboratory - This course would involve blind high school students and the graduate students in a Special Education Laboratory. A laboratory school atmosphere would prevail, since the graduate students would instruct the high school students in activities relating to the basic areas of wood, metal, transportation, and electricity. Through an evaluation process of the progress and reactions of the high school students, appropriate changes and adaptations in teaching methods will be recorded.

c. Foundations of Education - A graduate course in the historical, philosophical, and psychological movements in education as they influence present day educational practice. Contrasting philosophies would be examined to aid the student in clarifying his own educational philosophy and to draw implications for the teaching of Industrial Arts with special emphasis on teaching the blind.

2. Select twenty industrial arts teachers of blind students to participate in the program.
3. Secure the cooperation of five blind high school students to serve in the Experimental Special Education Activities Laboratory.
4. Plan special seminars with and seek the assistance of technical consultants in industrial arts education and special education during the progress of the program.
5. Submit to the Office of Vocational Rehabilitation a complete professional report, evaluation, and analysis of the program upon completion.

The activities set forth above to be carried out between June 20, 1960 and August 26, 1960, as follows:

June 20 - July 1 Planning for development of Program

July 5 - August 12 Laboratory and professional experiences for graduate students.

August 51 - 26 Analysis of course and preparation of final report

The coordinator of the six-week institute to be Dr. James R. Hastings Professor, College of Education, Oswego, New York. In addition to supervising all activities of the program, Dr. Hastings also taught the Special Education Activities Laboratory.

The request was approved and a grant to implement the program as outlined was received under OVR 240-60 in May 31, 1960.

Appreciation is expressed for all the materials and guidance provided by the Office of Vocational Rehabilitation and The American Foundation for the Blind in the organization and administration of the workshop.

Special appreciation is expressed to Mr. J. Albert Asenjo of the American Foundation for the Blind for the personal interest and direction which he provided in getting the program established and the assistance he rendered during the six weeks the workshop was in session. Special appreciation is also due Dr. John M. Hurley, supervisor of industrial arts in the New York City public schools for his invaluable assistance and guidance throughout the workshop

WORKSHOP PARTICIPANTS AND STAFF

STAFF

Coordinator and Project Director

Dr. James R. Hastings
Professor of Industrial Arts
State University College of
Education, Oswego

Technical Laboratory Instructor

Dr. William E. Huss
Professor of Industrial Arts
State University College of
Education, Oswego

Education Professor

Dr. Charles Phallen
Professor of Industrial Arts
State University College of
Education, Oswego

Consultants

Mr. J. Albert Asenjo
Program Specialist in Vocational
and Rehabilitation Services
American Foundation for the Blind

Dr. John M. Hurley
Head Supervisor of Industrial Arts
City of New York Public School

Mr. Arthur Voorhees
Program Specialist in Vocational
and Rehabilitation Services
American Foundation for the Blind

Mr. Robert Gunderson
New York Institute for the Blind

Mr. Smith A. Padgett, Instructor
Tennessee School for the Blind

Mr. Harold Bates, Instructor
Tennessee School for the Blind

Mr. Robert Mertens, Instructor
New York State School for the Blind

Mr. Willard Allen
Associate Professor of Industrial Arts
Transportation
State University College of Education
Oswego

Mr. Donald Shutts
Associate Professor of Industrial Arts
Electricity
State University College of
Education, Oswego

In order to publicize the program brochures (See Appendix A) were prepared and sent to as complete a mailing list of public and private schools and personnel as was available. This consisted of 50 residential schools and over 450 public school administrators to publicize the program.

Applications were received and evaluated and the following 12 graduate students qualified for the program:

Workshop Participants

Name	Teaching Address
Barnett, Jack	Pottersville, New York
Clayton, Isaac	Maryland School for the Blind Baltimore 6, Maryland
Edwards, Travis	School for the Blind Austin, Texas
Frakes, Glenn	Kansas School for the Blind 1100 State Street Kansas City, Kansas
Henderson, Eliot	California School for the Blind Berkeley, California
Holmes, Dennis	Iowa Braille and Sight Saving School Vinton, Iowa
Lurry, David	Georgia Academy for Blind (Col. Div.) 1030 Shurling Drive Macon, Georgia
McCleary, Samuel	Western Penn. School for the Blind 201 N. Bellefield Avenue Pittsburgh 3, Pennsylvania
Meehan, Michael	Missouri School for the Blind 3815 Magnolia Street St. Louis, Missouri
Noble, Wayne	Utah School for Deaf and Blind 846 20th Street Ogden, Utah
Pickering, Don	Nebraska School for the Blind Nebraska City
Wessel, Theodore	Illinois Braille and Sightsaving School Jacksonville, Illinois

Blind High School Students

Student Name and Address	Vision	Age	Grade	Previous Industrial Arts Experience
1. John Farnum Angelica, New York	Totally Blind	16	10th	7-8th grade
2. Ronald Pugliese Newcomb, New York	Totally Blind	18	10th	7-8th grade
3. Paul Janson Tonawanda, New York	Totally Blind	16	10th	None
4. Leonard Uber Akeley, Pennsylvania	Totally Blind	16	7th	7-8th grade
5. Orlo Nichols Cobleskill, New York	Totally Blind	19	11th	Radio 2 years

Part I

Organization of the Workshop

In order for the broad purposes of the workshop to be accomplished it was recognized that each of the courses constituting the workshop should have definite objectives and a well defined procedure for achieving these objectives. College staff members, with the coordinator, participated in developing a complete course outline for each of the separate courses (See Appendix B). To clarify the procedures used a brief description of how each of the courses was conducted and the way they were coordinated with each other follows.

The Special Education Laboratory

This course was designed to provide the technical instruction and practical laboratory experiences necessary to broaden and improve the technical competence of the industrial arts instructors.

A survey of needs - Since it was anticipated that the graduate students in this course would have a varied range of technical preparation and experience, it was deemed advisable to survey each individual to determine his strengths and weaknesses before attempting to establish a set program of instruction. This was done by questionnaire (See Appendix C). From this survey it was determined that the areas of electricity and transportation should receive the greatest emphasis in the technical instruction provided.

A weekly program of technical instruction - Each week was planned to make maximum use of the workshop staff and qualfied consultants over the six week period. The instructional program for each of the six weeks follows showing the hourly breakdown to provide units of instruction to groups of individuals needing instruction in special areas:

Instructional Program
Special Education Laboratory 250
Dr. Huss

	Time		Instructor	Location
Tuesday July 5	8:00	Registration	Hastings	
	9:00	"	"	
	10:00	"	"	
	11:00	"	"	
Wednesday July 6	8:00	Orientation: The Program	Staff	General Shop
	9:00	Introduction to Lab. Course	Huss	" "
	10:00	Interviews with students	Staff	" "
	11:00	Supervised Work Session	Huss	" "
Thursday July 7	8:00	Course Requirements	Huss	General Shop
	9:00	The Multimeter - how it works	"	" "
	10:00	Basic Theory of DC Voltmeter	"	" "
	11:00	The Galvanometer in Use	"	" "
Friday July 8	8:00	Basic Theory of Wheatstone Bridge	Huss	General Shop
	9:00	Ohmmeter for measuring resistance	"	" "
	10:00	The Braille Technical Press	"	" "
	11:00	Auditory Circuit Analyzer	"	" "
Saturday July 9	8:00	Survey of tools adapted for blind students	Huss	Electricity Shop
	9:00	Diodes as Rectifiers	"	General Shop
	10:00	Jigs and Fixtures to aid blind students	"	" "
	11:00	Capacitors - How they work	"	" "

Week of July 11, 1960

	Time		Instructor	Location
Monday July 11	8:00	Introduction to Electronics	Gunderson & Heavner	Electricity Shop
	9:00	The Auditory Circuit Analyzer	Gunderson & Heavner	" "
	10:00	Tube Tester, DC Voltmeter	Gunderson & Heavner	" "
	11:00	Electronics Course in High School	Gunderson & Heavner	" "
Tuesday July 12	8:00	Voltage Reversal System AC Rectifier	Gunderson & Heavner	" "
	9:00	Wheatstone Bridge Ohmmeter	Gunderson & Heavner	" "
	10:00	DC Ammeter, Auditory Continuity Tester	Gunderson & Heavner	" "
	11:00	Signal Generator, Potentiometer Bridge	Gunderson & Heavner	" "
Wednesday July 13	8:00	Types of Electronics Kits Available	Huss	Electricity Shop
	9:00	Kits for basic electricity	"	Electricity Shop
	10:00	Project planning requirements	"	General Shop
	11:00	Supervised Work Session	"	General Shop
Thursday July 14	8:00	Transformers vs. Series filament circuits	Huss	Electricity Shop
	9:00	Basic Ohmmeter Circuit	"	General Shop
	10:00	Transformers and Auto-transformers	"	" "
	11:00	Supervised Work Session	"	" "
Friday July 15	8:00	Industrial Arts Transportation	Allen	Trans. Shop
	9:00	Ignition System Theory	"	" "
	10:00	Distributor: Gap, points, dwell angle	"	" "
	11:00	Specifications available: Shop Manual Chilton's Motors Manual	"	" "

Week of July 18, 1960

	Time		Instructor	Location
Monday July 18	8:00	Introduction to Machine Shop	Bates	Metal Shop
	9:00	Parts of Lathe	"	" "
	10:00	Straight Turning, Center Drilling	"	" "
	11:00	Facing	"	" "
Tuesday July 19	8:00	Introduction to Electricity	Padget	Electricity Shop
	9:00	Radio Servicing in Residential Schools	"	" "
	10:00	AC-DC Radio Circuits	"	" "
	11:00	Amplifiers	"	" "
		Grinders and Grinding	Bates	Metal Shop
Wednesday July 20	8:00	Detector Circuits using Crystal Diodes	Huss	General Shop
	9:00	Selectivity vs. Sensitivity	Huss	General Shop
	10:00	Supervised Work Session	Padget Bates Huss	Electricity Shop Metal Shop General Shop
	11:00	Supervised Work Session		
Thursday July 21	8:00	Impedance Matching	Huss	General Shop
	9:00	Erectronic kits using Jiffy-clips	Huss	Electricity Shop
	10:00	Supervised Work Session	Padget Bates Huss	Electricity Shop Metal Shop General Shop
	11:00	Supervised Work Session		
Friday July 22	8:00	Coordination with Experimental H.S. Lab.	Huss	General Shop
	9:00	Circular Saw: Ripping, Cross-cut angles, etc.	Huss	General Shop
	10:00	Supervised Work Session	Huss	General Shop
	11:00	Supervised Work Session	Huss	General Shop

Week of July 25, 1960

	Time		Instructor	Location
Monday July 25	8:00	Spark Plug Service	Allen	Trans. Shop
	9:00	Compression Test	Allen	" "
	10:00	Ignition Timing	Allen	" "
	11:00	Idle Speed and Idle Mixture Setting	Allen	" "
Tuesday July 26	8:00	Brake Work and Bleeding Brakes	Allen	Trans. Shop
	9:00	Greasing Front End	"	" "
	10:00	Small Engine Tune-up	"	" "
	11:00	Small Engine Maintenance	"	" "
Wednesday July 27	8:00	Mr. Mertins - Industrial arts in a residential school		General Shop
	9:00	Personal Interviews conducted by Mr. Asenjo, Dr. Hurley, Dr. Hastings, Dr. Huss		General Shop
	10:00	How to make your own "Jiffy-Clips"	Huss	General Shop
	11:00	Raising Metal	Huss	Metal Shop
Thursday July 28	9:00	Spot Welding	Huss	Metal Shop
	10:00	Arc Welding	Huss	Metal Shop
	11:00	Sheet Metal Bar Folder	Huss	Metal Shop
Friday July 29	9:00	Acetylene Welding	Huss	General Shop
	10:00	Sheet Metal Brake: Box and Pan Brake	Huss	Metal Shop
	11:00	Sheet Metal Forming Rolls	Huss	Metal Shop

Week of August 1, 1960

	Time		Instructor	Location
Monday August 1	8:00	Production of Electricity	Shutts	Elect. Shop
		Bicycle Repair	Allen	Trans. Shop
	9:00	Sheet Metal Forming Rolls	Huss	Metal Shop
	10:00	Erectronic Kits	Shutts	Electricity Shop
		Arc Welding: Running a Bead	Huss	Metal Shop
	11:00	Basic Radio	Shutts	Electricity Shop
Tuesday August 2	8:00	Mr. Voorhees: Introduction to Machine Shop	Voorhees	General Shop
	9:00	Milling Machines and Milling	"	Metal Shop
	10:00	Reading braille micrometer	"	" "
	11:00	Cutter Sharpening and care	"	" "
Wednesday August 3	8:00	Shaper: Its function	Voorhees	Metal Shop
	9:00	Types of Shaping Operations	"	" "
	10:00	Four point method of safety	"	" "
	11:00	Work Session	"	" "
Thursday August 4	8:00	Eliminating the A Battery	Shutts	Electricity Shop
	9:00	Eliminating the B Battery	Shutts	Electricity Shop
		Acetylene Welding	Huss	Metal Shop
	10:00	Eliminating the C Battery	Shutts	Electricity Shop
		Seaming and Hemming in Sheet Metal	Huss	Metal Shop
	11:00	Radio Reception	Shutts	Electricity Shop
Friday August 5	8:00	Circuit Diagrams	Shutts	Electricity Shop
	9:00	Component Parts	Shutts	Electricity Shop
		Spinning Lathe	Huss	Metal Shop
	10:00	Placement of Parts	Shutts	Electricity Shop
	11:00	Sources of Electronic Materials	Shutts	Electricity Shop

Week of August 8, 1960

	Time		Instructor	Location
Monday August 8	8:00	Automotive Lubrication	Allen	Trans. Shop
		Submit Plan Sheets	Huss	General Shop
	9:00	Supervised Work Session	Allen Huss	Trans. Shop Metal Shop
	10:00	Supervised Work Session	Allen Huss	Trans. Shop Metal Shop
	11:00	Supervised Work Session	Allen Huss	Trans. Shop General Shop
Tuesday August 9	8:00	Rectifiers and Diodes	Shutts	Trans. Shop
		Front Wheel Lubrication	Allen	Trans. Shop
	9:00	Transformer Power Supplies	Shutts	Electricity Shop
		Supervised Work Session	Allen, Huss	Trans. Shop
	10:00	AC Power Supplies	Shutts	Electricity Shop
		Supervised Work Session	Allen, Huss	Trans, Shop
	11:00	Supervised Work Session	Shutts Allen Huss	Electricity Shop Trans. Shop Metal Shop
Wednesday August 10	8:00	Equipment and Supplies for Transportation Shop	Allen	Trans. Shop
	9:00	Submit completed projects	Huss	General Shop
	10:00	Electrical Teaching Aids	Shutts	Electricity Shop
	11:00	Supervised Work Session	Huss Shutts Allen	General Shop Electricity Shop Trans. Shop
Thursday August 11	8:00	Final Instructions for Closing	Huss	General Shop
	9:00	Evaluation	"	" "
	10:00	Supervised Work Session	"	" "
	11:00	Shop Clean-up and Maintenance	"	" "

	Time		Instructor	Location
Friday August 12	8:00	Final Overview of the Program	Staff	General Shop
	9:00	Written evaluation	Huss	" "
	10:00	Final Completion of all work and reports	Huss	" "

Students were not expected to participate in all lessons presented but were directed to attend those lectures and demonstrations which were needed in order to broaden their technical competence.

Project Activities:

Project activities were selected by each student in consultation with the instructor. Each individual was directed to select problems or projects which would satisfy the following requirements:

1. Provide an opportunity for the student to gain new skills and technical information.
2. Serve as an appropriate teaching aid or typical project which might be used with his own students in his school or as a project to use with one of the blind high school students to be instructed in the experimental special education activities laboratory in the afternoon session.
3. Provide an opportunity to practice new instructional procedures and techniques.

Project Analysis

To make the industrial arts instructor cognizant of the values of each project and to sharpen his insight in the instructional problems involved in each project undertaken, the student was requested to complete a analysis of each project to show what would have to be taught in order for a blind student to construct the project. Representative examples of these analysis are contained in Appendix E.

The students were encouraged to work individually and in small groups under the supervision of the laboratory instructor and the other consultants utilizing the facilities of as many as four different shops in any given period. This unrestricted use of facilities provided a maximum opportunity for each student to gain individual instruction and competance and to progress as rapidly as possible

while using the excellent physical facilities available.

This opportunity to study and compare the layout, design, storage and equipment in the various shops and laboratories provided a breadth of understanding of needed industrial arts facilities for many of the participants in order to enrich their own program.

Texts:

In order that all participants would have a common basic source of reference for their work in each of the four technical areas, the following current textbooks were selected as those best suited to the purposes of the workshop:

Allen, Willard A., Know Your Car, Chicago, American Technical Society, 1960

Feirer, John L., General Metals, New York, McGraw Hill, 1959.

Feirer, John L., General Woodwork, New York, McGraw Hill, 1959.

Marcus, Abraham, Basic Electricity, Englewood Cliffs, New Jersey, Prentice Hall, 1958.

Supplemental instructional materials were also prepared and distributed by the instructor and consultants in certain areas not adequately treated in the texts (See Appendix F).

The Experimental Special Education Laboratory

This course was organized as a laboratory school situation where the industrial arts instructors were divided into teams of two or three and assigned a blind high school student for a period of approximately three weeks to try out various units of instruction in the areas of wood, metal, electricity, and transportation. This course was conducted for two hours daily by Dr. James Hastings.

The purpose of this grouping was to provide an opportunity for instructors to plan a sequence of lessons (See Appendix G) in a given area and then try out various instructional procedures to identify problems that might be encountered and develop new and useful teaching aids and techniques.

A further important purpose of this course was to attempt to determine what units of instruction, processes, and operations could feasibly be taught blind students in industrial arts. To substantiate this, an evaluation of all instruction presented was prepared by a recorder for each instructional team each day. A record of these evaluations will be found in Part III of this report.

Rotation of Teaching Learning Experience

In order that each blind high school student might have as interesting an educational experience as possible and so that each industrial arts instructor might gain as broad an experience in teaching as possible, the teams were rotated and the area of instruction changed each three weeks as follows:

First Three Weeks		Second Three Weeks	
Student & Subject	Instructors	Student & Subject	Instructors
Student A (Woodwork)	A B C	Student B (Electricity)	D A B
Student B (Metalwork)	D E	Student E (Woodwork)	I E
Student C (Electricity)	F G	Student D (Transportation)	J K
Student D (Electricity)	H I	Student C (Metal)	F H
Student E	J K L	Student A (Transportation)	L C

Instructional Pattern:

Instructors were encouraged to suggest projects which the students would be interested in that would allow for a maximum of teaching opportunities and that would provide opportunity for evaluation of as broad a range of experiences as possible.

Allowing each student to work on a given project for approximately three weeks permitted the instructors to develop a logical instructional sequence and at the same time provide the student with a realistic learning experience for the purpose of evaluating progress in a given area.

Instruction in all cases was presented as rapidly as the student was able to absorb and apply the information. Time consuming, repetitious performance of operations was eliminated as soon as it was determined each student was able to understand and perform operations taught. This was the only departure from a normal classroom procedure and was felt justified in order to expose each student to a maximum number of experiences and operations for purposes of evaluation.

This rapid broad exposure not only provided the basis for evaluating the possible student experiences but was most revealing to the instructors for they were thereby exposed to a much broader teaching experience than would have been possible under ordinary circumstances. All the instructors agreed that this was the most beneficial to them. It was also very satisfying to the blind students for they felt the rapid progress which they were able to make exceeded anything they had thought possible before coming into the program.

Foundations of Education

This course provided the opportunity to establish a sound philosophical and psychological basis for the educational thought of all participants. The wide diversity of undergraduate preparation represented by the industrial arts instructors, required a thorough understanding and development of the background of industrial arts philosophy for proper application of instructional procedures in the experimental laboratory.

Seminar discussions were utilized to associate problems of instructing the blind to the broad philosophy of education wherever possible. This pattern served to further coordinate the thinking of the group and the work of the total workshop program. This course was conducted for one and one half hours daily by Dr. Charles Pahllen.

Part II

Industrial Arts Activities Evaluated

Several major purposes of the workshop were met by having the industrial arts instructors organize and present instruction to the blind high school students. This procedure achieved the following results:

1. Provided a broad opportunity for the teachers to gain experience in organizing and presenting many units of instruction in two or more areas of work.
2. Enabled the instructors to evaluate the feasibility of presenting certain units of instruction to blind high school students in industrial arts.
3. Enabled the instructors to try out in actual practice various teaching aids, devices and techniques and to modify these in practice as the situation required.

Instruction Presented and Processes Performed:

The following table shows that at least two students were instructed in all the areas thereby providing a check on the practicality of certain types of work and units of instruction. The table also shows the number of processes which were performed in each of the four areas. The total of 284 processes which were performed successfully by the students is shown by areas.

Area	Number of processes performed	Number of students instructed
Woodwork	68	2
Electricity	80	3
Transportation	60	2
Metalwork	76	3

The majority of the processes were performed by two students and in some cases by three students. A detailed breakdown of the various units of instruction and the number of processes successfully accomplished by the blind students in each of the four areas of instruction is shown on the following pages. Each asterisk after a topic indicates that the unit was successfully performed by a student. Three asterisks indicates that three students performed or were instructed in that unit successfully.

WOODWORK

I.	Planning and laying out		
	1. Measuring with a rule	*	*
	2. Marking with a awl, square	*	*
	3. Measuring with a tape	*	*
	4. Measuring with a roll-matic	*	*
	5. Laying out duplicate parts	*	
II.	Sawing		
	1. Crosscutting with different guides with hand saw	*	*
	2. Crosscutting with circle saw	*	*
	3. Ripping with circle saw	*	*
	4. Cutting curves on band saw with special guards, devised by instructors	*	*
	5. Cutting curves on jig saw with special guards, devised by instructors	*	*
III.	Hand planing		
	1. Planing a surface	*	*
	2. Planing an edge	*	*
	3. Planing end grain	*	*
	4. Planing bevel	*	*
	5. Adjusting plane	*	*
	6. Sharpening plane iron blade	*	
IV.	Using wood fastenings		
	1. Nails	*	*
	2. Screws	*	*
V.	Wood finishing		
	1. Sanding and preparing surface	*	*
	2. Rubbing down finishes	*	*

VI.	Using the jointer		
	1. Adjusting the table and fence	*	*
	2. Using the guard	*	*
	3. Jointing the edge	*	*
	4. Beveling	*	
VII.	Using the table saw		
	1. Adjusting machine	*	*
	2. Adjusting and using guard	*	*
	3. Ripping and crosscutting	*	*
	4. Cutting stock to length	*	*
VIII.	Using the band saw		
	1. Adjusting the machine	*	*
	2. Cutting curves	*	*
	3. Crosscutting	*	*
IX.	Using the jig saw		
	1. Adjusting machine	*	*
	2. Cutting curves	*	*
X.	Using the drill press		
	1. Adjusting drill press	*	*
	2. Drill a stop hole	*	*
	3. Drill a hole for screws	*	*
XI.	Using the wood lathe		
	1. Centering mounting stock	*	*
	2. Turning cylinder	*	*
	3. Chucking		

Demonstrations and Related Lesson Topics

I. Wood		
1. Kind and habitat	*	
2. Growth of trees	*	
3. Uses of various woods	*	
4. Classification and identification	*	*
5. How lumber is seasoned	*	*
6. Structure of trees	*	*
II. Drawing and layout		
1. Kind of drawing	*	*
2. Layout of tools	*	*
3. Kind, uses and sizes	*	
III. Saws		
1. Kind, uses and sizes	*	*
2. Filing saws	*	
3. Safety rule in sawing	*	*
IV. Planes		
1. Kind, uses and sizes	*	*
2. Use of quality tools	*	*
V. Maintenance of tools		
1. Whetting	*	
2. Kinds of stones	*	
3. Lubrication	*	
VI. Clamping devices		
1. Type and kinds	*	
VII. Abrasives		
1. Grades	*	

VIII. Common fasteners

1. Joints, kind and uses * *
2. Glue, kind and uses * *

IX. Wood finishing

1. Stain * *
2. Purpose * *
3. Fillers, kinds *
4. Equipment used in finishing * *
5. Applying rub-on finish * *

X. Woodworking and machinery

1. Type, sizes and cost * *
2. Safety rules * *
3. Range of work * *
4. Maintenance problem

XI. Factors to consider in the purchase of material * *

XII. Special jig developed by group

1. Two hand saw guides
2. Guide and guard for band saw
3. Guide and guard for jig saw
4. Guide for planing

ELECTRICITY

Operations and Processes

I. The nature of electricity			
1. Kind of electricity	*	*	
a. Static	*	*	*
b. Positive-negative	*	*	*
c. Current	*	*	
1. Direct	*	*	*
2. Alternating	*	*	*
2. The electron theory	*	*	*
a. Molecules	*		
II. Ohm's law			
1. Current	*	*	*
a. Ampere	*	*	*
b. Measurement	*	*	*
c. Laws that govern current	*	*	*
d. Practical uses	*	*	*
e. Reading an ammeter	*	*	*
2. Voltage	*	*	*
a. Volt	*	*	*
b. Measurement	*	*	*
c. Laws that govern voltage	*	*	*
d. Reading a volt meter	*	*	*
3. Resistance	*	*	*
a. Ohm	*	*	*
b. Measurement	*	*	*

c. Practical uses and values			
1. Control flow of current	*	*	*
2. Production of heat	*	*	
5. Electrical symbols	*	*	*
III. Electro-chemistry			
1. Primary and secondary cells	*	*	
2. Storage batteries	*	*	*
IV. Conductors and electrical circuits			
1. Wire and wire sizes			
a. Splicing wire	*	*	*
b. Removing insulation	*	*	*
c. Soldering connections	*	*	*
2. Kinds of circuits	*	*	*
a. Series	*	*	*
b. Parallel	*	*	*
3. Protection of circuits	*		
a. Fuses	*	*	
b. Insulation	*	*	*
V. Crystal set circuits	*	*	
1. Testing crystals	*	*	
2. Types of circuits	*	*	
3. Testing variable condensers	*	*	
4. Testing fixed condensers	*	*	
5. Explanation of circuits	*	*	
VI. Magnets and magnetism			
1. Nature of magnetism	*		
a. Materials used for magnets	*		
b. Attraction and repulsion	*		

c. Poles	*		
d. Lines of force	*		
e. Magnetic field	*		
VII. Types of magnets	*		
1. Natural magnets	*		
2. Artificial magnets	*		
a. Permanent	*		
b. Electromagnets	*		
VIII. The motor			
1. Types of motors	*		
a. Direct current	*		
1. Principles	*		
2. Commutator construction	*		
3. Fields	*		
4. Armature	*		
5. Armature windings	*		
IX. Bells and buzzers			
1. Parts of an electric bell or buzzer	*	*	
2. How electricity rings a bell	*		
3. The circuit	*		
4. Connections	*		
5. Source of current	*	*	*
6. Wiring bell circuits	*	*	
X. Radio			
1. Purpose of parts			
a. Coil	*	*	
b. Variable condenser	*	*	
c. Crystal	*	*	

	d. Fixed condenser	*	*
	e. Aerial and ground	*	*
2.	Characteristics of radio waves	*	*
	a. Produced at broadcasting station	*	*
	b. Frequency and wave length	*	*
	c. Travel through space	*	*
3.	Tuning of radio	*	*
	a. Length of aerial	*	*
	b. Movable coil	*	*
	c. Variable condenser	*	*

TRANSPORTATION

Auto Mechanics

Problems and Processes - Part I

I. Lubricating

1. Chassis * *

2. Wheel bearing (pack) * *

3. Replacing filter cartridge * *

4. Air cleaner * *

II. Tires

1. Checking for nails * *

2. Checking for breaks and cuts * *

3. Checking pressure * *

4. Simple tire repairs * *

III. Battery

1. Inspecting and filling * *

2. Cleaning terminals * *

3. Lubricating posts * *

IV. Brakes

1. Checking * *

2. Checking emergency * *

3. Checking brake fluid * *

4. Simple adjustments * *

V. Spark plugs and ignition

1. Testing plugs * *

2. Cleaning * *

3. Adjusting points * *

4. Replacing burned plugs * *

VI. Fuel system

1. Removing air cleaner and washing * *

2. Adjusting carburetor *

3. Checking fuel lines for leaks *

Problems and Processes - Part II

I. Chassis

1. Frame

   a. Examining frame * *

   b. Note type and construction * *

2. Brakes

   a. Disassembling, inspecting, reassembling * *

   b. Identifying parts * *

   c. Adjusting both types * *

3. Wheels, rims, tires

   a. Removing and inspecting tires and tubes * *

   b. Inflating and checking pressure * *

II. Motor units

1. Valves

   a. Testing compressions * *

2. Tappets

   a. Inspecting * *

   b. Adjusting * *

3. Gaskets

   a. Identifying types * *

   b. Inspecting * *

   c. Replacing * *

PART III

Small Engines

I. Orientation

1. Start run test and stop engine * *
2. Inspect for oil and gas leaks * *
3. Inspect for loose parts * *
4. Clean engine * *
5. Disassemble and reassemble * *

II. Maintenance

1. Clean and adjust spark plug *
2. Inspect flywheel magnets *
3. Clean and adjust points *

III. Tune up

1. Start engine *
2. Adjust carburetor proper mixture *

PART IV

Outboard Engines

I. Preliminary examination

1. Check operating instructions, loose parts, clean engine, fuel engine *
2. Mount, start, run and stop *

II. Maintenance

1. Check operation at all speeds *
2. Remove from tank mount on outside stand and wipe clean *

PART V

Bicycles

I. Preliminary examination		
1. Front wheel hub and bearings	*	*
2. Chain	*	*
3. Pedal crank and bearings	*	*
4. Rear wheel and coaster brake	*	*
5. Slim assembly	*	*
II. General repair		
1. Replace broken spokes	*	
2. Tighten spokes	*	
3. Replace handle grips	*	
4. Tire and tube repair	*	
5. Adjust seat	*	
6. Adjust handle bars	*	

METALWORK

BENCH WORK			
Using Measuring Tools	*	*	*
Using Bench Tools (Center Punching)	*	*	*
Using Hand Hack Saw	*	*	*
Operating Power Hack Saw	*		
Burring	*		
Using Layout Tools (Laying Out)	*	*	*
Laying Out Work on a Bench or Surface Plate	*	*	
Filing in a Bench Vise	*	*	*
Cleaning a File	*	*	*
Polishing with Abrasive Cloths	*	*	
Using a Micrometer	*		
Setting and Using Calipers	*	*	
DRILL PRESS			
Mounting and Holding Work on Drill Press	*	*	
Adjusting Drill Press	*	*	
Drilling on Drill Press	*	*	
LATHE (Between Centers)			
Drilling Center Holes Between Centers	*		
Mounting Work Between Centers	*	*	
Facing Ends Between Centers	*	*	
Straight Turning (Set lathe tool)	*	*	*
Turning Shoulders	*	*	*
Turning Grooves	*	*	
Turning Angles with Compound Rest	*	*	
Turning to a Micrometer Measurement	*		
Making Rough and Finishing Cuts on Lathe	*	*	*

Reading a Micrometer	*		
Reading a Vernier Caliper	*	*	*
LATHE (Chuck Work)			
Mounting and Trueing	*		
Facing Work Held in Chuck	*	*	
Centering Work held in Chuck	*		
Cutting-off Stock in Lathe (Parting)	*		
MILLING MACHINE			
Milling a Flat Surface	*		
Milling a Key Way or Groove	*		
Cutting Spur Gears	*		
SHAPER			
Adjusting Shaper for Stroke and Position	*		
Making Horizontal cuts with shaper	*		
Squaring Rectangular stock	*		
BENCH GRINDER			
Using Bench Grinder	*	*	
PRECISION GRINDER			
Surface Grinding	*		
<u>Sheet Metal</u>			
Using Measuring Tools	*	*	*
Measuring with Micrometer Caliper	*		
Using Layout Tools	*	*	*
Making Simple Layouts	*		
Laying out Notches (Notching)	*		
Laying out Edges and Seams	*	*	
Developing Patterns by Parallel Line Method	*		
Using Bench Tools	*	*	
Transferring Patterns	*		

Using Hand Snips (Cutting)	*	
Using Stakes	*	*
Bending Metal	*	*
Filing	*	*
Cleaning a File	*	*
Filing, Tinning and Forging a Soldering Copper	*	*
Soldering Using an Iron	*	*
Finishing a Grooved Seam	*	
Using Solid and Hollow Punches	*	
Using Hand and Breast Drill	*	
Riveting	*	
Using Hand Hack Saw	*	
Setting Down a Single Seam	*	*
Using Bar Folder (Hemming)	*	*
Using Standard Hand Brake	*	
Using Slip Roll Forming Machine (Forming)	*	
Using Squaring Shear	*	*
Using Ring and Circle Shears	*	
Drilling Small Holes	*	
Using Bench Grinder	*	
Soldering Using a Torch	*	

<u>Wrought Iron</u>

Laying Out a Pattern	*	
Calculating Length for Irregular Shapes	*	
Bending a Scroll (Bending Jig)	*	*
Recognizing a Good Scroll	*	
Riveting	*	
Enamel Finish	*	*

Welding

Welding Steel	*
Spot Welding	*

Evaluation of Lessons Taught

It has been stated that the instructors worked in teams in the organization, planning and presenting of instruction to the blind students. Instructors alternated in their responsibility for presenting instruction from day to day or from unit to unit whichever seemed most practical. This procedure provided a breadth of experience for the instructors and also gave them adequate opportunity to observe other teaching methods and provided time to prepare for the next day's instruction.

Each day's lesson or unit was evaluated for its effectiveness, difficulties encountered, special instructional aids required and student reaction. The written evaluations of these lessons are included as a part of this report to show the types of projects which the students worked on, and to more accurately reflect the approach which was used in each lesson in order to present it to the blind students.

Appendix D of this report consists of diagrams of the projects which the blind students worked on or a list of jobs which they performed, in the case of transportation. The diagrams are followed by a written evaluation of the lessons presented to the student in order that he might successfully complete the job he was working on.

Summary

The preparation of the written evaluations sharpened the instructor's insights regarding problems which might be encountered and fostered a rich exchange of viewpoints and ideas among the group as instruction progressed. The written evaluations were duplicated and distributed to the entire workshop group each day thereby enabling those who were teaching in electricity to follow the progress and approaches being used in teaching transportation if they were unable to actually observe the instruction being presented.

PART III

Teaching Suggestions and Aids

Teaching Aid Ideas fpr Automotives and Small Engines

A. Test Equipment (Shop made)

1. Tachometer
2. Dwell meter
3. Vacuum gauge
4. Pressure gauge
5. Timing light
6. Gas mileage gauge

B. Automotive Engines

1. Operating cut away of engines
2. Sectioned and cut aways
   a. Oil pump
   b. Oil filter
   c. Starter solenoid
   d. Starter - Bendix drive and over running clutch
3. Engine parts - cleaned and labeled

C. Automotive Fuel

1. Sectioned and cut aways
   a. Carburetor
   b. Fuel pump - single acting
   c. Fuel pump - combination fuel and vacuum booster

D. Automotive Ignition

1. Ignition system - mock of parts in working order
2. Cam dwell teaching aid
3. Heat ranges of plugs - shells cut away
4. Delco-Remy teaching aid of coil and condenser
5. Parts and clip leads - for orientation to system

E. Automotive Electrical

1. Cut away of storage battery
2. Sectioned generator
3. Headlight aiming screen

F. Automotive Chassis

1. Sectioned shock absorbers
2. Sectioned muffler
3. Teaching aid showing various types of tire wear and giving causes
4. Sectioned differential
5. Sectioned standard transmission

6. Sectioned automatic transmission
7. Mock up of hydraulic brake system - constructed with front wheel so that front wheel lubrication can be demonstrated as well as brake adjustment and bleeding.

G. Small Engines

1. Operating cut away of 4 cycle engine
2. " " " " 2 cycle engine
3. Cleaned and labeled parts
4. Mock up of flagwheel magnets ignition system
5. Sectioned and cut away outboard engine

Teaching Aids and Ideas for Electricity

1. <u>Demonstration board to show voltage production</u>

    a. Simple hollow core coil and bar magnet

    b. Piece of zinc and piece of copper for simple cell

    c. Iron and copper wire thermocouple (heat)

    d. Selenium photo cell - light

    e. Phonograph cartridge - pressure

    f. Comb on cloth (static)

    (all wired and read through micro-ammeter or auditory circuit analyzer)

2. <u>Resistance demonstration board</u>

    Board containing wires of different size, length, material with means of varying temperature. Wires hooked in series with audio circuit analyzer.

3. <u>Conductors and Insulator Board</u>

    Mount pieces of variety of materials, wire, wood, glass, fibre, metals, carbon, plastics, with means of supplying low voltage current or use audio circuit analyzer directly.

4. <u>Fused Circuit Board</u>

    Series circuit with device for holding tin foil fuse in series with variable resistance (reostat or series of light bulbs) hooked to low voltage power source.

5. <u>Wire Size Board</u>

    Panel upon which various diameter wires are mounted permanently with braille marked wire gauge for checking.

6. Resistor Board (For learning color code)

    Panel with series of various size resistors mounted with leads to which audio circuit analyzer can be hooked.

7. Series Parallel Board

A panel on which is mounted two 6-12 volt lamp sockets with double pole double throw switch (knife switch desirable) for completing series or parallel circuit. Hook to low voltage transformer or power source.

8. Magnetic Fields About a Coil

Panel with hollow core oil with provision for inserting iron core wired series with low voltage DC source. Provide compass with glass face removed and north pole of needle identified for checking lines of force.

9. Reactance and Impedance Board

Panel with coil made with large (#16) magnet wire with 500 turns on 1" diameter cylinder. Make a movable laminated core of iron wires twice as long as the coil which can be inserted in coil. Lamps may be hooked in series with core for student to see effect of moving core - student may also feel buzzing of core. Connect coil to AC current.

10. Transformer Principle

Using coil made for teaching aid #9 and same core construct second coil of 250 turns of #16 wire. Slide second coil over core for demonstrating primary and secondary coil action.

11. Direct Current Motor

Large scale simple motor to show motor principles also series and shunt connections; forward and reverse; spped control by varying voltage or rheostal in line.

12. Illumination

Incandescent and fluorescent lights with foot candle meter.

13. Crystal radio panel circuit

Simple crystal radio circuit employing loop stick, diode and variable capacitor.

14. Transistor Amplifier Panel

Transistor resistor (220,000 ohm) and capacitor (,05) battery (3 v.) to be connected to crystal radio panel to show amplification through earphone connections.

15. Vacuum tube amplifier

16. Selenium rectifier power supply

17. Phototube circuit

May be connected to relay for open and close door burglar alarm turn lights off and on.

Suggested Woodworking Teaching Techniques for Blind Students

1. The 4 point safety pattern should be reviewed and each student made aware of it for each new machine to which he is introduced.
2. Students should be made aware of the location and nature of the cutting edge or dangerous part of any tool or machine when first introduced to it.
3. Make adequate marks with scratch-awl for student to follow in measuring and laying out. Use a scratch mark rather than a dot or hole.
4. A small notch may be used on edge of work to mark location for starting a cut.
5. Student should be introduced to simple drawings by means of raised line drawing kit as soon as possible to get him used to reading a plan.
6. Special jigs or devices such as those shown on pages 55-57 may be used in getting student started in sawing and planing.
7. The student should be taught to identify woods by smell, feel, density and weight.
8. Rub-on fast drying finishes such as Seal-o-cell are more practical than brush-on finishes.
9. Templates of plywood or sheet metal may be used whenever duplicate parts need to be made.
10. Safety zone markings of abrasive tread material should be placed on the floor around all machines and their use strictly observed.

Suggested Metal Teaching Techniques for Blind Students

1. When teaching cutting sheet metal with snips, scribe metal heavily so student can feel line with snips or finger nail. Nich edge metal to locate start point if needed.
2. Perforated sheet metal is a good material to use for early experience. The pattern is useful in guiding cuts and provides decorative appearance.
3. Soldering can be performed more readily by use of electrical soldering iron or soldering gun depending on size of job and thickness of metal.
4. Soldering with propane torch is practical with some practice. Torch with button valve is recommended. Student should orient himself to joint with unlit torch for practice.
5. Spot welding is an ideal method for joining sheet metal and light weight wrought iron.
6. Table model hand operated sheet metal shears are easier for the blind student to use and operate than the floor model foot operated models.
7. The braille rule is most effective in layout work on sheet metal. Used mainly on flat work.
8. Introduce student to the metal lathe and show student the main parts of the machine with the motor off. Instructor should mount work in lathe for student as an introduction to what it does.
9. Start student on the lathe by using horizontal cuts with the apron handwheel used manually.
10. Bending wrought iron to a 90° angle may be accomplished by bending metal in a vise with the metal parallel to the top of the vise jaws and using side of vise for squaring off bend.

11. All wheels on the lathe or any machine can be operated more effectively when the student understands one complete turn of the wheel is one hour on a clock, 1/4 turn being 15 min. on a clock, etc. Also he should know the amount of travel of one complete revolution.

12. If repeating a certain cut on the lathe or milling machine it is advantageous for the student to count the number of revolutions of the apron hand wheel to find his starting and stopping points.

13. When working on the metal shaper the student can understand better the operation of the machine and can more easily tell the progress if he keeps one hand riding safely on the clapper-box and the other hand on the clutch.

14. The student should become familiar with the sounds and vibrations of a normal operating machine and be ready to stop the work immediately when a drastic change takes place.

15. When setting a cutting tool for lathe work, it is much easier if student uses the dead center on tail stock to adjust tool on center.

16. When using the bar folder, the way to measure depth of fold is by making trial folds measuring them, and then adjusting machine to proper setting.

17. Student should keep scrap metal clear of all working surfaces as soon as metal is cut. This can be done easily if the teacher attaches a scrap bin to sheet metal benches.

18. Putting a stopping block on the lathe bed for making horizontal cuts will prevent the student from running cutting tool into the lathe chuck.

Suggested Electricity Teaching Techniques for Blind Students

1. Know the color code for resistors. The student needs this information as a basis for electronics.
2. Arrange spools of hook-up wire in color code order so student can easily select the color of wire he is to use.
3. Stress importance of exactness to the student. Proper connections and tight windings are necessary to achieve success.
4. Complicated coils should be bought. Don't waste time winding big coils, however a student should be taught to wind a simple coil. One of the easiest to wind is a crystal coil (about 150 turns on $1\frac{1}{2}$" tubing.)
5. Create situations which might arise in the student's mind. They may be answered as the student works on his experiment or project.
6. Have at least 2 sets and if possible 3 sets of head phones. 1 low impedance 1,000 ohm. or 2,000 ohm - 1 high impedance (crystal earphone) - 1 medium impedance (5,000 ohm).
7. Use enameled wire for winding coils. The insulation breaks off in the process of unwinding and rewinding.
8. Use a crystal set in good working order so that the student may follow plans to a successful experience. This means a good aerial and ground as well as head set.
9. When building a crystal set with a loop stick, use approximately 10 turns of #20 plastic insulated wire wound over the loop stick with ends hooked to aerial and ground to improve selectivity and sensitivity. Loose wound coil over loop stick increases selectivity.
10. When explaining a transformer have a small one that works a light bulb that heats up enough for the student to feel.

11. Use bases to mount all materials on whenever possible. When using circuits it is necessary to have components firmly mounted so the student can trace the circuit without pulling connections apart or tangling them.
12. Check all soldered joints. Beware of cold soldered joints and poor connections.
13. When soldering, try to assemble and solder as many joints as possible before placing them into complicated areas like radio chasis.
14. Purchase a circuit analyzer as soon as possible. Let the student test as many things as possible (even body resistance).
15. Success is one of the best drivers. Le the student gain confidence in his work by experiencing success with his first experiments.
16. A mock up board showing the various means of producing electricity, electrolitic, magnetic, heat, etc., is most useful in explaining electricity to the beginner.
17. Shock hazard can be minimized by touching only one wire at a time.
18. Some commercial kits are not sufficiently durable for continuous use.
19. Erectronic kit L-100W is desirable for durability (Science Electronics Inc.)
20. Circuits using lights for resistances should have buzzers or other auditory devices substituted.
21. Electrical symbols or braille labels should be made large for identifying parts of a circuit when using the raised line kit for drawing schematics.
22. Beginning students in electricity should mount components on one side of a base and do all wiring and soldering on the same side in the case of small radios, etc.
23. In making small radios use of sheet plastic or metal which can be bent perpendicular to form a panel for mounting control knobs, switches, etc. enables the student to confine wiring and work to one surface.

Suggested Transportation Teaching Techniques for Blind Students

1. Cut-aways and mock ups of all types of components on the automobile and small engine are essential to teaching the student the parts of the automobile.
2. A thorough orientation to all the component parts of the automobile and engine and their relationship to each other is essential before attempting to teach the student about various parts of the automobile.
3. Ignition - In checking point gap the knife or blade type feeler gauge is easier for the student to use than a wire feeler gauge.
4. Assembling an ignition system using a dry cell battery, coil and distributor is an effective teaching device for teaching the ignition system.
5. Students can be taught to clean and gap spark plugs but we do not have an effective device adapted for telling when the plug is clean. The wire feeler gauge is used in checking gap on the plugs.
6. Students can effectively tear down and reassemble small motors (one and two cycle) in one day. To assist the student in keeping parts separated and in order a compartmented cup cake tin might be used. The student should be taught to place parts in separate compartments as they are removed. When reassembling they can be removed from the compartments in reverse order.
7. In working on jobs or problems students may work in teams of one to three. It is better if they work alone if there are enough separate jobs. If there are partially sighted students in the class, place a partially sighted student with a totally blind student to work.
8. Students should be encouraged to use a normal working posture so that they develop stance, stability and comfort while working in handling tools and parts.
9. Compression checks can be performed by adapting a standard gauge so that it can be read by feel by removing cover glass.

10. Setting of tappets can be performed with the motor running (hot setting) or with the motor cold by using a jumper lead to the battery to turn the engine over.
11. Bicycle work can be performed satisfactorily by blind students but it is desirable to have a partially sighted or sighted person work with the student.
12. In checking timing on an engine cellophane can be placed between the points and the distributor rotated until the points open and the cellophane can be pulled out.
13. Start outboard motors and small engines and allow student to run and adjust carburetor settings to develop interest.
14. When student works on parts of engine on a bench make sure parts are anchored on a base or placed in a vise to enable student to concentrate on what he is doing rather than on holding parts in position.
15. Have a work table with a well in the center to collect all pieces which might drop or roll off the bench and get lost. Other means might be the use of a magnetic table top or a cloth or canvas apron to catch small parts.

Summary Proposals and Recommendations for Teaching
Industrial Arts to Blind Students

1. Industrial arts is general education, not vocational.

2. The six basic objectives of industrial arts are:

    a. To develop in each pupil an insight and understanding of industry and its importance in our culture.

    b. To discover and develop talents of students in the technical fields and applied science.

    c. To develop technical problem-solving skills related to materials and processes.

    d. To develop in each pupil a measure of skill in the use of common tools and machines.

    e. To provide the student with a breadth of experiences which he may use as a basis for future educational and vocational choice.

    f. To enable each student to achieve a degree of self realization from the creative manipulative experiences provided.

3. Industrial arts should be made available at the elementary and secondary school level and at the adult level.

4. The source of subject matter for industrial arts is industry itself.

5. In teaching industrial arts, opportunity should be provided for students to do individual and group projects, participate in line production projects and do experimentation and research work. The emphasis, however, must be on the learning experience involved and not on the finished product.

6. The students should gain a degree of proficiency in the use of common tools, machines, materials and the language of <u>several</u> basic industries.

7. Industrial arts on the elementary level utilizes the facilities and the teacher of the elementary classroom in integrating industrial arts activities with general education subjects.

8. Industrial arts on the junior high school level should provide exploratory and guidance values.

9. Industrial arts on the senior high school level, while considered primarily as general education and valuable to all students preparing to live in our industrial technical culture, provides for a concentration of subject matter to prepare students for Industrial Education Centers, for industrial-vocational courses or for engineering.

10. Industrial arts on the adult level helps to provide hobby and leisure time interests.

11. All industrial arts programs should make provision for and be challenging to both the bright students and the slow learner.

12. The nature of the industrial arts program and the subject matter taught must be determined by the stated objectives and not by the special interests and abilities of the teacher.

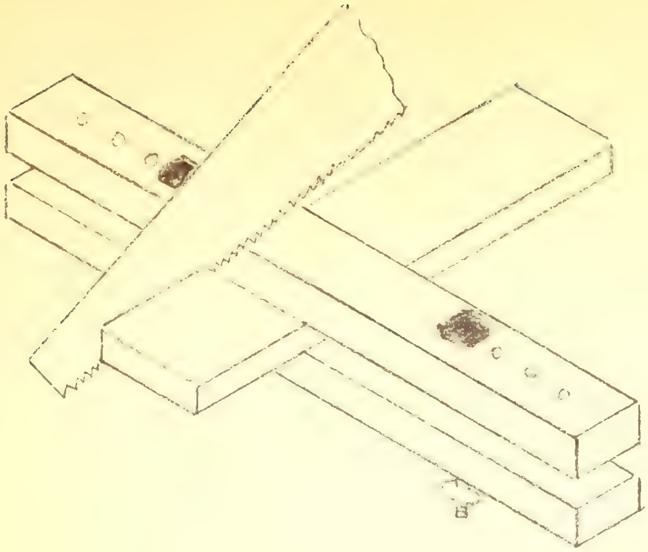
13. Textbooks should be used and outside assignments made for all industrial arts courses.

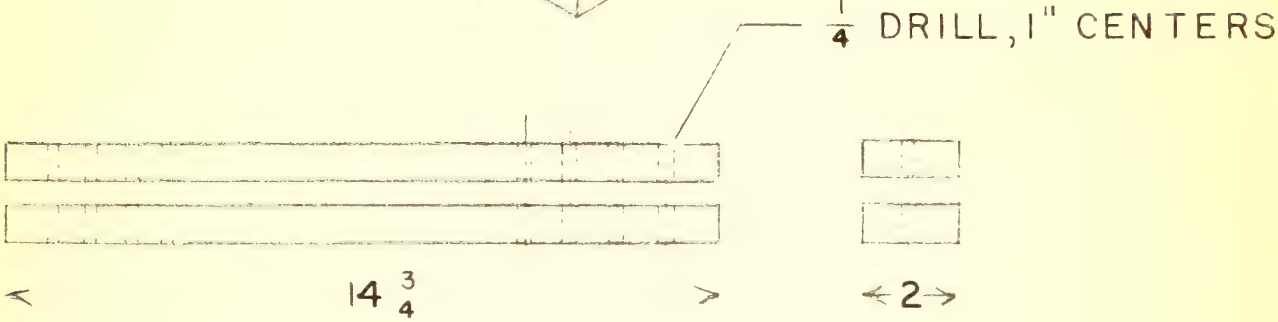
14. Cooperative activities between the industrial arts department and other departments of the school are desirable and should provide desirable learning experiences for the students.

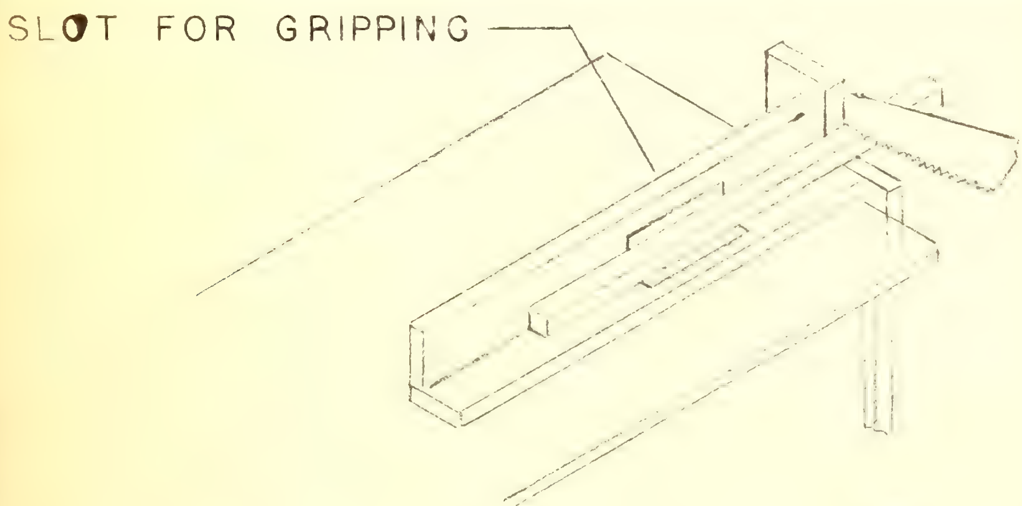
15. Industrial arts should not be considered primarily as a feeder for vocational education but for the blind student it should serve a most valuable purpose of preparing students to profit from vocational rehabilitation services.

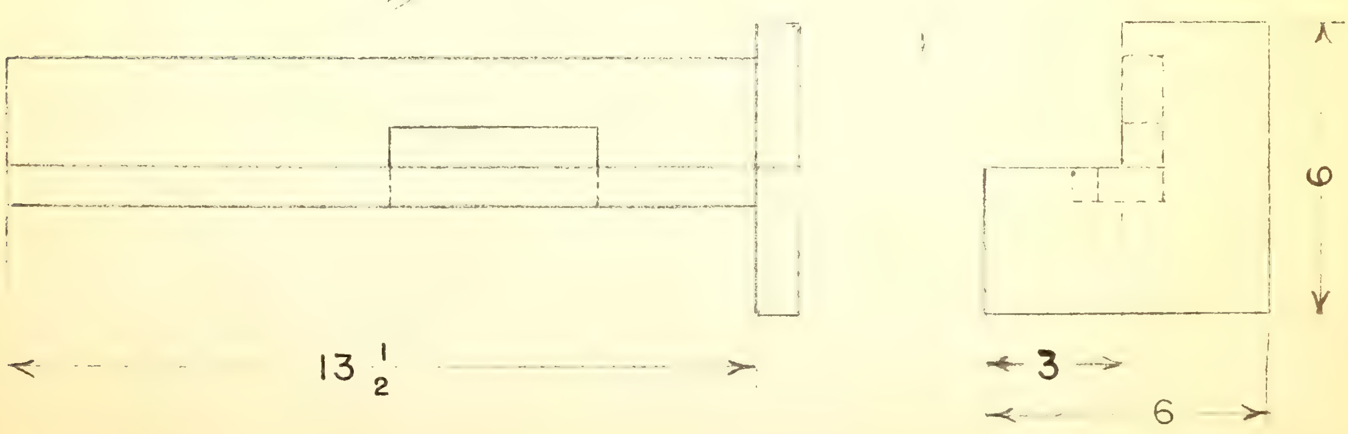
16. Emphasis should be placed on the inventive and problem solving activities of industrial arts.
17. More emphasis should be placed on individual planning and design and less on copy work.
18. One unit of industrial arts should be required of all students on the junior high school level.
19. It would be better to close an industrial arts shop than to employ a teacher who is not technically and philosophically competent.
20. The individual project method of teaching should be supplemented with a variety of other teaching techniques.
21. Group teaching can be organized more efficiently around a group project for beginning students than through the use of individual projects.
22. Beginning students in industrial arts need not be confined to the learning of basic hand tool processes before learning machine processes.
23. Separate and different industrial arts courses should be provided for the superior students.
24. Special courses in industrial arts should be provided for the slow learner.

HAND SAWING GUIDES

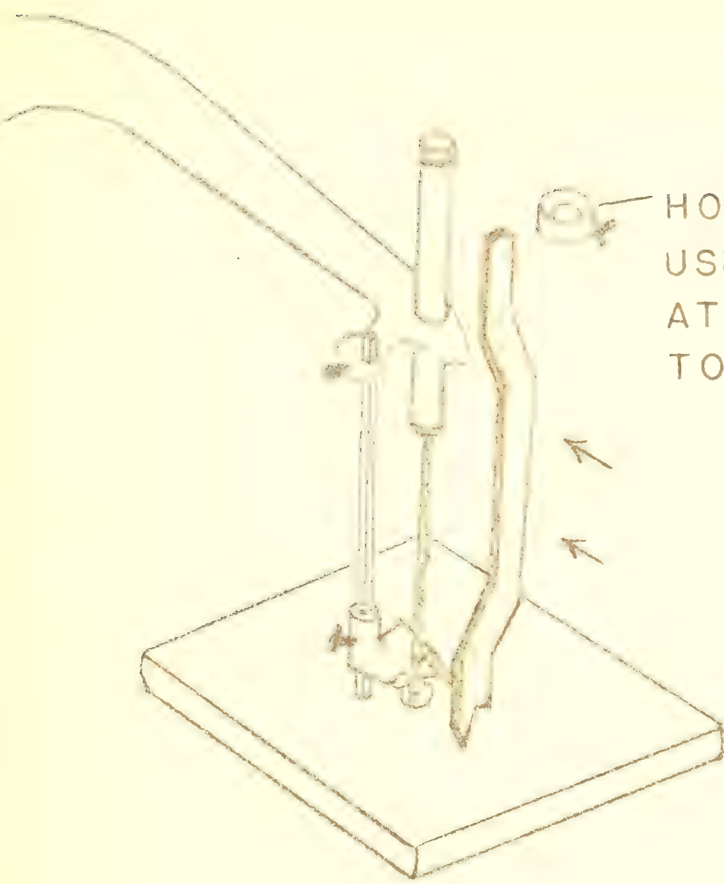


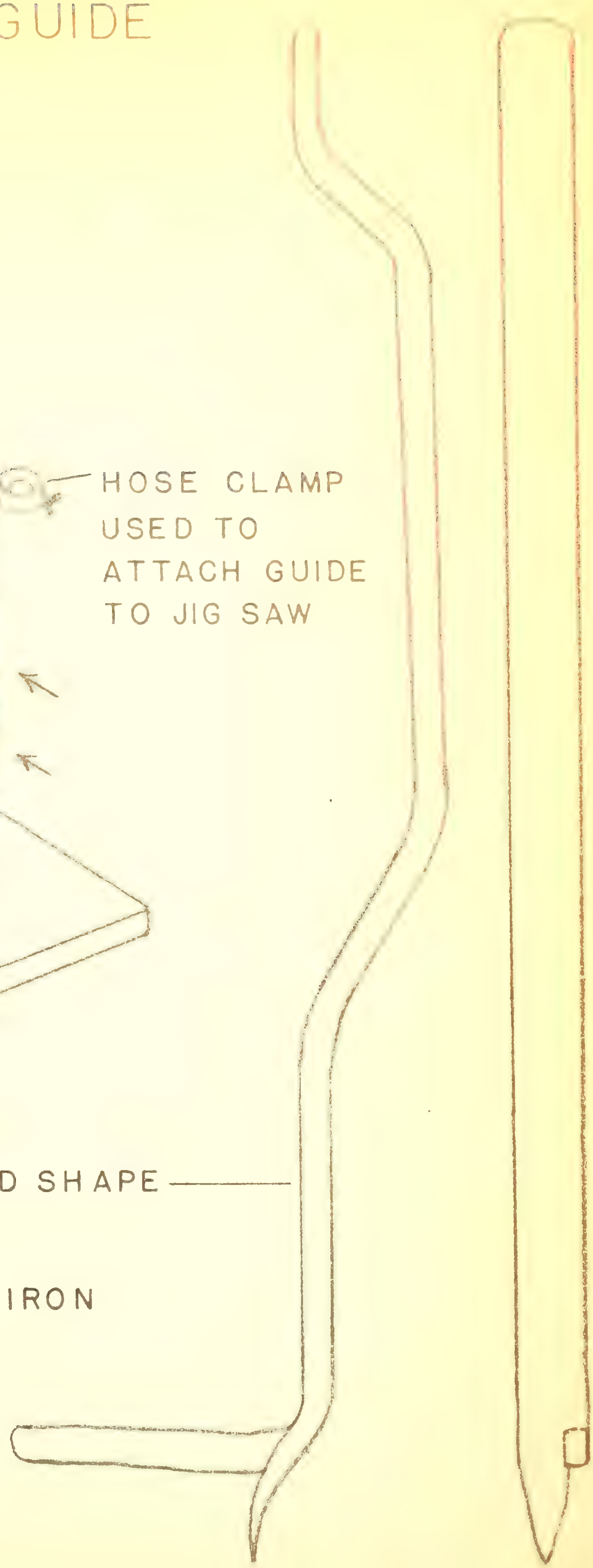




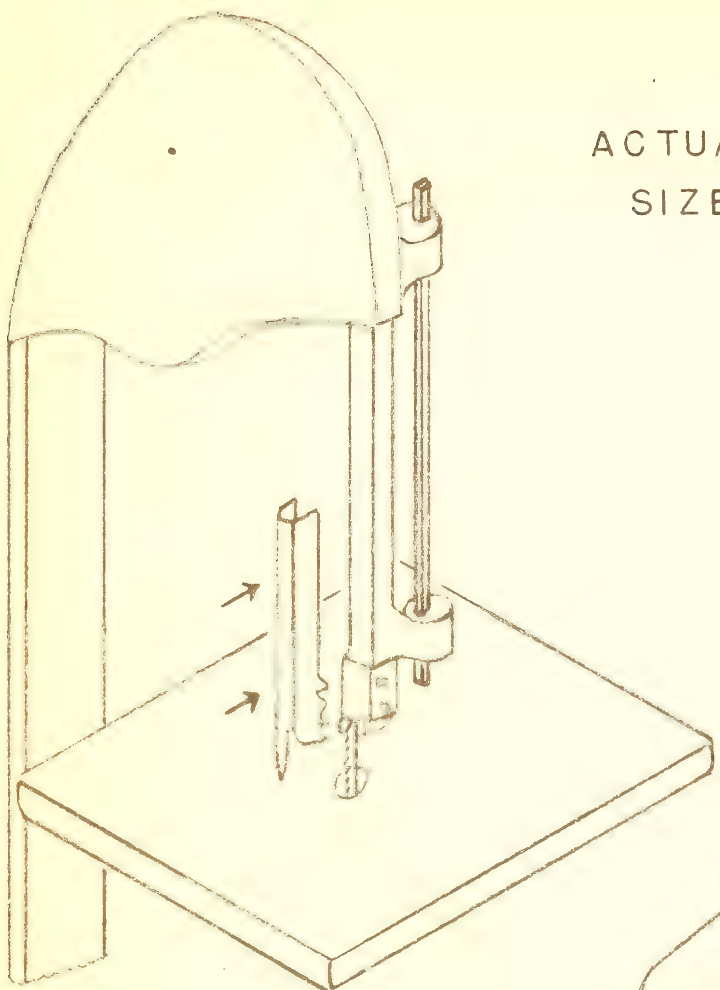


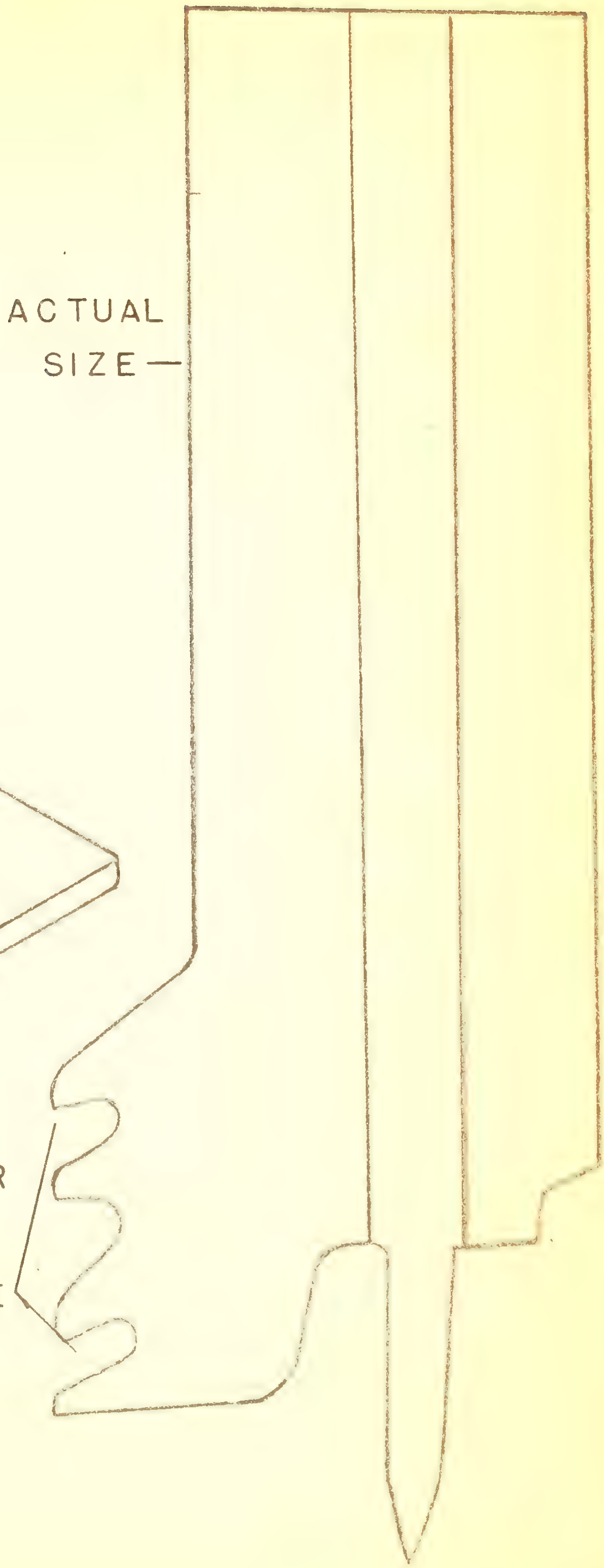
JIG SAWING GUIDE





BAND SAWING GUIDE





Part IV

Conclusions and Recommendations

As a result of the experiences of the twelve graduate industrial arts teachers and the work of the blind high school students in this experimental pilot training program during the six week period, the following conclusions are drawn:

1. The pattern under which this year's workshop operated was most effective for improving the competance and upgrading of standards for industrial arts teachers.
2. The wide diversity of experiences and background in the undergraduate preparation in the teachers of industrial arts in the United States necessitates a strong emphasis on the development of a sound philosophy of industrial arts in addition to the development of technical skills in order to upgrade standards.
3. Blind students, when provided with proper orientation and instruction, are capable of performing practically all the operations and tasks that a sighted student can do in industrial arts.
4. It is most effective to have teachers who doubt the ability of blind students to be able to see them perform technical operations because it was learned that even instructors who had been working with blind students were doubtful of many abilities until they actually saw the students perform them in this workshop.

5. Industrial Arts encompasses a broad area requiring considerable technical competence in each of its many areas. With a limited undergraduate background it was extremely difficult for the individual teacher to profit from advanced work in more than one or at the most two technical areas in the six week period.
6. An orientation to general teaching procedures to be used with blind students is very much needed by even those who have been teaching the blind before actual teaching begins. This becomes even more important when it is anticipated that in the future there may be more public school teachers enrolled in this workshop who have never taught blind students.
7. There is a need for providing greater opportunity for seminar discussion and group work on teaching procedures and problems of developing instruction within the framework of future workshops.
8. The presently available adapted tools and instruments for use by the blind are for the most part very practical and effective.
9. There is an immediate need for the development of more reference and textbook material available for the effective teaching of industrial arts to blind students.
10. Much more needs to be known regarding the problem of how to teach the blind person to make plans and to read and understand mechanical drawings of projects to be constructed.
11. Results of a workshop of this type are not immediately evident, therefore there is need for an evaluation of the programs affected by teachers who are enrolled to determine the nature of needed improvements to the program and its effectiveness.

12. With the increased numbers of students affected by rentrolentil fibroplasia who will need to be educated in the public schools there is need for greater publicity and meetings to acquaint administrators in the public schools such as guidance directors and directors of industrial arts with their responsibilities for teaching blind students in industrial arts.

13. The needs of some teachers of elementary industrial arts in grades k-6 were not able to be met during this session of the workshop. Immediate consideration should be given this broad area so that the needs of the public school can best be served.

14. In view of the experimental nature of a program of this type and the amount of individual attention which needs to be given the participants, the number of graduate students should be limited to 15.

15. More time is needed on the part of the project director to more fully publicize the program earlier in the year and to screen the applicants in order to obtain the best qualified teachers in the program.

16. In order to attract the best qualified teachers for a program such as this, the stipend needs to be increased to an amount at least equal to other similiar graduate stipend programs conducted in this state and elsewhere.

17. The adapted tools and instruments for use of the blind in the fields of woodwork and metalwork which are presently available are adequate but there is a pressing need for the further development of tools in all areas and most particular in the field of transportation and electricity.

Recommendations

From the conclusions previously stated and the experiences and observations made during the workshop, several recommendations can be made for extending the work which has been started and for conducting future industrial arts workshops.

The recommendations are made in order that industrial arts programs may be provided that are at least equal to the best programs for sighted children in public schools. These recommendations are further made in order that public school personnel may be made more fully aware of the capability of blind students and of the opportunities and facilities which should be provided for them.

1. This workshop training program for industrial arts teachers of the blind should be continued in view of the widespread need for this type of program. This need is based on the fact that only 12 persons were enrolled this summer from the approximately 50 residential schools and over 400 public schools in the country where blind students are educated. There are 6,483 students enrolled in residential schools and 6,834 students enrolled in public schools who may well be benefited through the services rendered to teachers eligible to attend this workshop.
2. The workshop should be structured and conducted essentially the same as it has been conducted this year with such improvements and strengthening as have been found necessary through the experience gained this year
    a. Technical - 3 semester hour course covering wood, metal, electricity and transportation with provision for each individual to select two areas for concentrated emphasis.

b. Special Education Laboratory - A laboratory school course where graduate students work with blind high school students.

c. Special Education Seminar in Industrial Arts Education - A seminar course structured to develop a sound philosophic basis of industrial arts education with provision for coordinated committee action on selected problems of teaching industrial arts to blind students.

3. Encouragement and support should be provided for the further development and production of special electronic devices for use by blind persons in working with and studying electricity. Certain devices have been developed but are not available in production.

4. Authorized agencies should be encouraged to make more braille texts available in the area of industrial arts. The following texts are recommended for production:

   Allen, Willard A., Know Your Car, Chicago: American Technical Society, 1960.

   Feirer, John L., General Metals, New York: McGraw Hill, 1959.

   Marcus, Abraham, Basic Electricity, Englewood Cliffs, New Jersey: Prentice Hall, 1958.

   In so far as possible these texts should contain braille diagrams.

5. Authorized agencies should be encouraged to develop and produce short units of related reference material that students might listen to in the industrial arts shop or library. These units might be produced on tape and should be about 20 minutes in length on well selected, commonly taught units of instruction in wood, metal, electricity and transportation.

6. Research and experimentation should be conducted in the area of drawing and planning to develop tools, materials and teaching techniques appropriate for use by the blind.

7. **Authorized agencies should be directed and encouraged to adapt and develop more tools and instruments for use by blind students in the areas of woodwork, metalwork, transportation and electricity.**

8. In order to upgrade and uphold the standards of industrial arts in a national program, there needs to be a stronger emphasis placed on the development and interpretation of the basic philosophy of industrial arts in future workshops and on a national basis.

9. A two day seminar in conjunction with the workshop should be conducted for approximately 10 directors and/or supervisors of industrial arts in school systems in which there are educational programs for the blind. This seminar would do much to publicize and promote the possibilities and value of industrial arts for the blind students in those systems.

10. Responsible public and private school administrators should be made aware of and strongly urged to encourage industrial arts teachers in their systems to participate in this workshop program.

11. The term of a future contract needs to be extended to cover the necessary work of the workshop coordinator during the year when publicity must be prepared and distributed, mailing lists prepared, applicants screened and selected, and other necessary details connected with the successful coordination of the program performed.

APPENDIX A

PUBLICITY BROCHURE

APPENDIX B

WORKSHOP COURSE OUTLINES

STATE UNIVERSITY OF NEW YORK
COLLEGE OF EDUCATION
OSWEGO

I.A. Education 225 Dr. Hastings
Experimental Special Education
Activities Laboratory

COURSE OUTLINE

Course Description:

An experimental special education laboratory course involving blind high school children as students in a laboratory school atmosphere. Graduate students enrolled will be expected to select and prepare units of instruction to involve the high school students in the areas of wood, metal, electricity, and transportation. Experimental teaching procedures will be evaluated and student progress recorded for purposes of making appropriate changes and adaptions in teaching techniques and procedures.

Purposes:

1. To provide opportunity for the experimental teaching of selected units of instruction in wood, metal, electricity, and transportation. Experimental teaching procedures will be evaluated and student progress recorded for purposes of making appropriate changes and adaptations in teaching techniques and procedures.

Objectives:

1. To provide opportunity for the experimental teaching of selected units of instruction in wood, metal, electricity and transportation.
2. To ascertain the most appropriate techniques and procedures for teaching selected units of instruction.
3. To provide opportunity to evaluate the effectiveness of certain types of instruction for purposes of modifying teaching procedures.

4. To assist in determining the most appropriate teaching content and rate of instruction for the blind high school student of average ability.
5. To provide opportunity for experimental use of certain special teaching devices, tools and aids to determine their values in teaching the blind.

I. <u>Experimental Procedures and Activities</u>

1. Graduate students will be divided into teaching-evaluating teams and assigned one or more blind high school pupils as students to be instructed.
2. Each team will be expected to outline an instructional sequence to be followed in one of the basic areas and to develop appropriate experimental student activities as a basis for the instruction. The instructional sequence should include information as well as manipulative technical type lessons of graduate difficulty.
3. Members of the team will rotate their responsibility within the group for instructing, recording, observing and evaluating.
4. A summary evaluation of each lesson presented will be made outlining the method of instruction, problems encountered with suggestions for correcting and the pupil's response and progress made.

EXPERIMENTAL INSTRUCTIONAL EVALUATION

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
	Special Aids or Devices Used		Student Reaction

BIBLIOGRAPHY

Allen, W. A. Know Your Car. Chicago. American Technical Society. 1959.

American Foundation for the Blind. Industrial Arts for Blind Students, Group Report #6, New York, The Foundation, 1960.

American Vocational Association. A Guide to Improving Instruction in Industrial Arts. Washington, D.C. 1953.

Best, John W. Research in Education. Englewood Cliffs, N.J. Prentice-Hall, 1959.

Burton, W. H. The Guidance of Learning Activities. New York, Appleton Co. 1942.

Chappel, Hiram J. Instructional Guide. Washington Office, Vocational Rehabilitation Bulletin #110.

Cooke, S. R. Electrical Things Boys Like to Make. Milwaukee, Bruce, 1942.

Crouse, W. H. Automotive Service and Trouble Shooting. N.Y. McGraw-Hill, 1915.

Cutsforth, Thomas D. The Blind in School and Society. New York, American Foundation for the Blind, 1951.

Ericson, Emanuel, Teaching the Industrial Arts. Peoria, Bennett, 1956.

Feirer, J. L. General Metals. New York. McGraw-Hill, 1952.

Feirer, J. L. Industrial Arts Woodworking. Peoria. Bennett, 1959.

Ford, W. B. Electrical Projects for the School and Home Workshop. Milwaukee. Bruce, 1948.

Frampton, M. E. Education of the Blind: A Study of Methods of Teaching the Blind. Yonkers World Book Company, 1940.

Frampton, M. E. & Gall, E. D. Special Education for the Exceptional. Boston. Porter Sargent, 1955. Vol. I, II, III.

Gunderson, R. W. "Radio Theory and Practice for the Blind". International Journal for the Education of the Blind. 1952, pp. 89-93.

Hjorth, H. Operation of Modern Woodworking Machines. Milwaukee. Bruce.

Jones, H. A. Machine Shop Practice. Milwaukee. Bruce, 1931.

Marcus, Abraham, Basic Electricity. Englewood Cliffs, N.J. Prentice Hall, 1958.

Miller, J. Metal Art Crafts. New York. D. Van Nostrand, 1948.

McAuley, John H. Vocational Schools as Training Facilities for Blind Workers. American Foundation for the Blind, 1954.

New York State Education Department. General Electricity (Related Information) Albany, N.Y. Delmar Publishing Co., 1950.

General Woodwork (Related Information)

General Metalwork (Related Information)

Olson, Delmar W. Industrial Arts for the General Shop. New York. Prentice Hall, 1955.

Soderburg, G. A. Finishing Materials and Methods. Bloomington, Ill., 1952.

Shea, J. G. and Wenger, P. N. Woodworking for Everybody. Scranton. Turrel Publishing Co., 1953.

South Bend Lathe. How to Run a Lathe.

Steinburg, W. B. and Ford, W. B. Electricity and Electronics - Basic. Chicago. American Technical Society, 1957.

The University of the State of New York. Electricity Project Ideas. Albany, 1957.

U.S. Office of Vocational Rehabilitation. Handbook of Representative Industrial Jobs for Blind Workers. Rehab. Service Series #58. Washington, D.C., 1958.

Warren, Roy L. "Blind Students in an Industrial Arts Shop". Industrial Arts and Vocational Education. Vol. 40. September 1951, p. 272.

STATE UNIVERSITY OF NEW YORK
COLLEGE OF EDUCATION
OSWEGO

I.A. Lab. 250 Dr. Huss
Special Education Laboratory

COURSE OUTLINE

Recent advantages in technology have made it necessary to take a new lock at the problem of the education of blind children. Advanced instrumentation made possible through advances in electronics and chemistry provide many new opportunities for the blind to participate in society as a regular contributing member.

Introduction:

This is a graduate course for experienced industrial arts teachers of the blind. The course will use an experimental approach to learning. The problems of learning faced by blind high school students will be studied as they affect the industrial arts course content in woodworking, electricity, electronics, transportation and drafting. Participating teachers will develop technical competence in each area in the process of building typical projects suitable for blind high school students and in constructing jigs, fixtures and adapted instrumentation. Participating teachers will advance their knowledge of technical related instruction as they prepare special instructional material and devices to be used as a part of the related instruction in the Experimental Special Education Laboratory Course.

The pattern of operation for this course will be based on group participation. Students will be arranged in groups of four to study the needs of blind students in industrial arts and to develop personal technical competence. Groups will be rotated from one area to another making it possible for each student to work in several areas and some students in all areas as the needs and abilities of each student is adjusted to the program of the course as a whole.

Unit 1: Problems of Learning Faced by Blind Students

- Braille Measurement devices
- Clamps and holding devices
- Saw guides
- Guards and safety devices
- Use of laminates and preformed materials
- Rub-on finishes

Unit 2: Problems of Presentation of Instruction

- Verbalizing directions
- Braille labels and signs
- Keeping things in their place
- Student mobility
- Tape recorders and talking books
- Arrangement of Physical Facilities - Shop Planning

Unit 3: Technical Subject Matter

- Processes most appropriate for blind high school students

Woodworking: Planning and Layout
Sawing
Hand Planing
Shaping
Chiseling
Boring
Sharpening tools
Joinery
Gluing and Assembling
Using Wood Fastenings
Wood Finishing
Using the Jointer
Using the Table Saw
Using the Band Saw
Using the Jig Saw
Using the Wood Turning Lathe
Using the Drill Press
Using the Shaper
Using the Router

Metalworking: Planning and Layout
Cutting
Folding
Forming
Seaming and Grooving
Wiring
Punching
Riveting
Bending
Crimping
Cutting Threads with Taps and Dies
Metal Spinning
Forging
Acetylene Welding
Electric Arc Welding
Foundry
Machine Shop Operations
Tool Bit Grinding
Facing and Turning
Drills and Drilling

Burring
Setting Down
Soldering
Raising
Annealing
Bending and twisting
Decorating
Finishing
Drilling
Filing
Grinding and Sharpening
Threads and Threading
Tapers and Taper Turning
Chucks and Chucking
Heat Treatment
Micrometers
Boring and Reaming
Shaper
Milling Machine
Grinder
Drill Press
Lathe

Electricity: What is electricity
Static Electricity
Direct-Current Electricity
The Electric Current
How Current flows through a Circuit
Effects of Electric Current
D-C Measuring Instruments
Alternating-Current Electricity
Induced EMF and the A-C Cycle
Characteristics of A-C
Factors Affecting A-C
A-C Measuring Instruments
Generators of Electricity
Mechanical Generators
Other types of generators of EMF
Practical Applications of Electricity
Applications Depending Upon Thermal Effect
Applications Depending Upon Luminous Effect
Applications Depending Upon Chemical Effect
Applications Depending Upon Magnetic Effect
Electric Motors
Electronics
The Electron Tube
Semi-Conductors
Practical Applications of the Electron Tube
Radio Communication
Industrial Applications
The Cathode-Ray Oscilloscope
Radar
Television

Transportation: Automotive Service
Engine
Fuel System
Ignition System
Electrical System
Chassis
Preventive Maintenance
Bicycle Maintenance and repair
Model Aircraft Engines
Small Gasoline Engine Repair
Outboard Engine Repair
Small Boat Planning and Construction
Light Aircraft Engines

Unit 4: Construction of Jigs, Fixtures and other adapted Instrumentation

- Analysis of need for instrumentation
- Using available pre-fabricated parts
- Holding devices: Tools
- Jigs as guides

Unit 5: Development of Special Instrumental Materials and Devices

- Raised Line Drawings
- Instructions Tape Recorded
- Contact film labels in Braille

Unit 6: Related Instruction

- Methods of teaching theory: Verbalism and realism
- Talking books

Assigned Readings:

Textbook Chapters

References

Bibliography

Allen, Willard A., Know Your Car (Chicago, Illinois: American Technical Society, 1960).

Asenjo, J. Albert, Industrial Arts for the Blind (New York: American Foundation for the Blind, 1960).

Begeman, M. L., Manufacturing Processes (New York: John Wiley, 1942).

Chevigny, H. and Braverman, S., The Adjustment of the Blind (New Haven, Conn.: Yale University Press, 1950).

Clapp, W. H. and Clark, D. S., Engineering Materials and Processes (Scranton, Pennsylvania: International Textbook Co.).

Cusworth, Thomas D., The Blind in School and Society (New York: American Foundation for the Blind, 1951).

Feirer, John, Industrial Arts Woodworking.

Feirer, John L., General Metals (New York: McGraw-Hill, 1959).

Frampton, Merle E. and Gall, Elena D. (ed.) Special Education for the Exceptional (Boston, Massachusetts: Porter Sargent Publisher, 1955).

Hathaway, Winifred, Education and Health of the Partially Seeing Child (New York: Columbia University Press, 1954).

Hesse, H. C., Engineering Tools and Processes (New York: D. Van Nostrand).

Kohn, Max and Starfield, Martin J., Materials and Processes (New York: Macmillan, 1952).

Ludwig, Oswald A., Metalwork Technology and Practice (Bloomington, Illinois: McKnight and McKnight, 1947).

Marcus, Abraham, Basic Electricity (Englewood Cliffs, New Jersey: Prentice-Hall Inc., 1958).

Sargent, R. F., What can the Blind Do? Philadelphia, Pennsylvania: Institution for the Instruction of the Blind, 1924).

Slurzberg, Morris and Osterheld, William, Essentials of Radio (New York: McGraw-Hill, 1948).

Smith, Robert E., Machine Woodworking (Bloomington, Illinois: McKnight and McKnight, 1948).

Smith, Robert E., Units in Bench Metal Work (Bloomington, Illinois: McKnight and McKnight, 1946).

Smith, Robert E., Units in Forging and Welding (Bloomington, Illinois: McKnight and McKnight, 1946).

Turner, Rufus P., Radio Test Instruments (New York: Ziff-Davis Publishing Company, 1945).

Young, J. F., Materials and Processes (New York: John Wiley, 1944).

Zahl, P. A. (ed.), Blindness: Modern Approaches to the Unseen Environment (Princeton, New Jersey: Princeton University Press, 1950).

Zbar, Paul B. and Schildkraut, Sid, Basic Electricity (New York: McGraw-Hill, 1956).

Zbar, Paul B. and Schildkraut, Sid, Basic Electronics (New York: McGraw-Hill, 1956).

Zbar, Paul B. and Schildkraut, Sid, Basic Radio and Radio Receiver Servicing (New York: McGraw-Hill, 1956).

I.A. EDUCATION 201
FOUNDATIONS OF EDUCATION

Course Outline

Summer - 1960

Description: This is the first in the sequence of three required courses in industrial arts education at the graduate level. The purpose of this course is to help the student understand the philosophical bases on which present-day education rests. During this study, a personal workable philosophy of education should develop for each student. Based upon these foundations, specific current trends to be studied in I.A. Ed. 215 will have more meaning. Of probably greater importance, educational practices encountered in your every-day teaching will have more meaning also.

Format: The basic course format follows the table of contents in the text: Hansen, Kenneth H., Philosophy for American Education, which every student must have (available in college bookstore). The text material is augmented by lectures, investigations, and required supplementary reading. Principal techniques include extensive discussion based on the text, oral committee reports on special topics, and informal debates on principal pertinent issues.

Student Assignments: The basic reading requirement is the text in which each student will be expected to gauge his progress according to class progress and individual preference. On the attached reading list will be found special references for each major topic. These have been carefully selected as supplementary material related to the special topics in the course. Also with the attached readings listed are a number of pertinent questions on each chapter of the text and related problems. Students are encouraged to keep these questions in mind as the readings are accomplished during the pursuit of the course.

It is anticipated that students will encounter many new educational words and terms. The meanings of these terms should be carefully studied from authoritative sources such as Dictionary of Education by Good, 1960.

All reading done for this course, aside from the text, should be listed on the Record of Reading form provided. An annotated report should be submitted for each chapter of the text. These annotations should include (1) a brief statement of the content, (2) a list of the "key points", and (3) a short statement of personal comments or reactions.

Writing requirements include a minimum of one term paper on an appropriate topic selected by the student with the approval of the instructor. The outline for this paper should be submitted not later than the week of July 18.

Evaluation: Most students enrolled in this course are just beginning graduate work. The course is therefore an opportunity for each student to evaluate himself as regards his capabilities for graduate work and as regards his promise as a potential "Master Teacher". Clews to the criteria for judgment can be gained by reviewing the factors to be considered by your instructor in arriving at grades for the course. Grades will be based on the promise shown for success in industrial arts teaching as indicated by:

1. Evidence of a professional attitude exemplified by:
    a. Regular attendance
    b. Professional attitudes reflected by responsibilities occurring from class activities related to discussions, readings, reports and committee work.

2. Quality of written work and oral reports showing:
    a. Adequacy of content
    b. Satisfactory organization
    c. Skill in oral presentations
    d. Scope of readings

3. Knowledge of subject matter:
    a. Quality of contributions for discussion
    b. Amount and effectiveness of reading
    c. Thoroughness of comprehension as revealed in test and examinations.

STATE UNIVERSITY OF NEW YORK
COLLEGE OF EDUCATION
OSWEGO

Selected Bibliography

I.A. Education 201

Summer 1960
Dr. Hiser
Dr. Phallen

UNIT I

PHILOSOPHY IN ACTION

A. Topics and problems for Study and Discussion:

1. What are the concerns of philosophy?
2. What is the scope of philosophy?
3. What, if any are the fundamentals in education?
4. What are the methods of inquiry used in philosophy?
5. Why is educational philosophy necessary?
6. What is the core of the American System of values, and some of the prevailing conflicts in american system of values?
7. What are some of the philosophical concepts and values regarding industrial arts?
8. Why does a teacher need a philosophy of education?

B. Readings:

1. Text - Chapter I
2. Broudy, Harry S., Building a Philosophy of Education, Chapt. I
3. Fifty-Fourth Yearbook, NSSE, Chapt. I
4. Forty-First Yearbook, NSSE, Chapt. I
5. Park, Joe, Selected Readings in the Philosophy of Education, Chapts. I, II, III.
6. Smith, Stanley & Shores, Fundamentals of Curriculum Development, Chapt. 4
7. Seefeld, Kermit, "My Philosophy of Industrial Arts", The Industrial Arts Teacher, Oct. 1950
8. Shoemaker, Charles E., "Industrial Arts in Modern Education", Eight Yearbook, ACIATE, 1959 Chapt. II
9. Bode, Boyd, H., Industrial Arts and The American Tradition, Epsilon Pi Tau Brochure, 1942

UNIT II

THE LANGUAGE OF PHILOSOPHY

A. Topics and Problems for Study and Discussion:
1. What are the views in educational philosophy regarding
   Realism
   Pragnatism
   Humanism
   Naturalism
   Theism
   Eclecticism

2. In addition what is meant by
   Essentialism
   Experimentalism
   Perennialism
   Reconstructionalism

B. Readings:
1. Text - Chapter II
2. Brubacher, John S., Modern Philosophies of Education, 1950, Chapt. XIV
3. Park, Joe., Selected Readings in the Philosophy of Education, p. 147-150, p. 180.
4. Baysinger, Gerald, "Progress in Industrial Arts" - I.A. Teacher April 1954.

UNIT III

EDUCATIONAL PHILOSOPHY FOR A NEW ERA

A. Topics and Problems for Study and Discussion:
1. What impact does cultural change have on the basic philosophy of education?
2. How did the philosophy of authoritarianism affect man in the Medieval Era?
3. What characterized the period of the Renaissance regarding man and freedom?
4. What is the trend of idealism vs. materialism in the 20th century?
5. What are some of the social problems of the 20th century.

B. Readings:
1. Text - Chapter III
2. Allen, Frederick Lewis, The Big Change; America Transforms Itself. New York: Harper and Brothers, Publishers, 1952.
3. National Education Association, Research Division, "Ten Criticisms of Public Education, "Research Bulletin, Vol. 35., No. 4 Dec. 1957
4. Pounds, Ralph L., and James R. Bryner, The School in American Society. New York: The Macmillan Co., 1959. Chapter IV)
5. Woodring, Paul, "The Decline of Educational Philosophy"; William O. Stanley, "Current tasks of Educational Philosophy"; Frederick Mayer, "Education as a Creative Endeavor", Phi Delta Kappan, Vol. XXXX, No. 1 (October, 1958)
6. Ryder, N.D., "Variability and Convergence in American Population" and Thomas, Donald B., "Implications of Demographic changes for Education "Phi Delta Kappan, June 1960, pp. 379-385

UNIT IV & V

CONFLICTING CONTEMPORARY PHILOSOPHIES OF EDUCATION AND CONTRIBUTIONS OF ESTABLISHED SYSTEMS.

A. Topics and Problems for Study and Discussion:
1. What are the major conflicts in American Education?
2. What are the major characteristics of
   idealism
   realism
   pragmatism
3. What have established philosophic systems contributes to education?

B. Readings:
1. Text - Chapter IV & V
2. Brubacher, John S., A History of the Problems of Education.
3. Modern Philosophies and Education. The Fifty-Fourth Yearbook of the National Society for the Study of Education, Part I. Chicago: The University of Chicago Press, 1959.
4. Park, Joe, Selected Readings in the Philosophy of Education.
5. Philosophies of Education. The Forty-First Yearbook of the National Society for the Study of Education, Part I. Chicago: The University of Chicago Press, 1942.

UNIT VI

EDUCATIONAL PHILOSOPHY AND RELIGIOUS BELIEF

A. Topics and Problems for Study and Discussion:
1. Can religion be isolated from educational problems
2. What is the scope of religion as given by Hansen
3. What was the place of religion in the early schools of America
4. Name some reasons why religion and philosophy cannot be separated
5. Is modern education hostile to religion
6. What practical value does religion have for guiding individual behavior

B. Readings:
1. Text - Chapter VI
2. Bayles, Ernest E., "A Relativistic Religion", Phi Delta Kappan, Vol. XXXX, No. 1 (October, 1958), pp. 33-36)
3. Brubacher, John S., Eclectic Philosophy of Education: A Book of Readings. New York: Prentice-Hall, Inc., 1951.
4. Butts, R. Freeman, "The Relation Between Religion and Education", Progressive Education, Vol. 33, No. 5 (Sept. 1956) pp. 140-42
5. Educational Policies Commission, Moral and Spiritual Valuesin the Public Schools. Washington,D.C., National Education Assoc. 1951
6. Phi Delta Kappan, May 1959 - Contains several excellent articles on religion and education.

UNIT VII

EDUCATIONAL PHILOSOPHY AND SCIENCE

A. Topics and Problems for Study and Discussion:
1. In what ways has science contributed to Educational Practice and understanding?
2. What is Science and are there so-called "Laws of Science"?
3. In terms of an acceptable definition of Philosophy is Science a Philosophy?
4. When is science opposed to theology?
5. List several contributions of Scientific methology to Educational philosophy.
6. What does science say today about how learning takes place? In addition what are the implications for conducting industrial arts activities?

B. Readings:
1. Text - Chapter VII
2. Harris, Ben. M. "Education, Science, and the New Religion" Phi Delta Kappan, March, 1959, pp. 250-253

UNIT VIII

EDUCATIONAL AIMS AS VALUES

A. Topics and Problems for Study and Discussion:
   1. What is the relationship between so-called theoretical and practical educational aims?
   2. Do educational aims motivate cultural change or does cultural influences aid in establishing educational goals?
   3. What is meant by the statement "Educational Aims are determined empirically rather than scientifically?
   4. What obligation does the school have in transmitting the "Cultural Heritage?
   5. Is the aim "Train the Intellect" a sound concept for the central purpose of the school program.
   6. On what basis, if any, can educational aims be established?
   7. How have theories of learning affected methods of teaching Industrial Arts?

B. Readings:
   1. Text - Chapter VIII
   2. Wilber, Gordon, "Industrial Arts and the Padagogical lag" School Shop, Sept. 1952
   3. Bode, Boyd H. How We Learn. (See Chapter VII) The Doctrine of Formal Discipline and (Chapter XVI) "Education and Social Outlook".

UNIT IX

WHAT IS MAN

A. Topics and Problems for Study and Discussion:
   1. What are some of the variations in man which the school must consider in organizing an educational program.
   2. What is meant by the statement that a "Human Being is experientially both a social being and an individual?
   3. How has education been affected by the Cosmic view of man as "Mostly Evil" or Man as "Naturally good".
   4. What is the justification of special programs for students with high I.Q.'s.
   5. What is the justification and need for the non-academic activities in the school program.

B. Readings:
   1. Text - Chapter IX
   2. Grinnell, John E. "Our Most Dangerous Neglect" Phi Delta Kappan. February 1960. pp. 213-216
   3. Horton, Robert E. "The ten Imperative Obligations of Youth" Phi Delta Kappan. Dec. 1959. pp. 100-101 and timely topics.
   4. Any Article on Teacher Pupil Planning from recent literature.

APPENDIX C

CHECK LIST OF INTERESTS AND NEEDS

NAME ______________________________ SCHOOL ______________________________

HOME TOWN ADDRESS _________________________ Home Town Newspaper ____________________

BACKGROUND:

Educational (brief statement) (Example: BS degree in Ind. Arts from Maryland, 1950)

Teaching Experience: (Ex: Batavia School for the Blind, 2 years)

Industrial or Trade Experience: (Ex: Carpenter for 2 years)

The following information is needed for the purpose of arranging groups and assignments in courses that will be advantageous to you and to the total program:

Check those areas where you have greatest strength:

( ) Woodworking
( ) Metalworking
( ) Electricity
( ) Electronics
( ) Transportation
( ) Drafting
( ) Other

Check those areas where you have need for strengthening as a part of your work in Summer 1960:

( ) Woodworking
( ) Metalworking
( ) Electricity
( ) Electronics
( ) Transportation
( ) Drafting
( ) Other

Write a brief statement of other information you think would help you in strengthening the program to fit your needs:

____

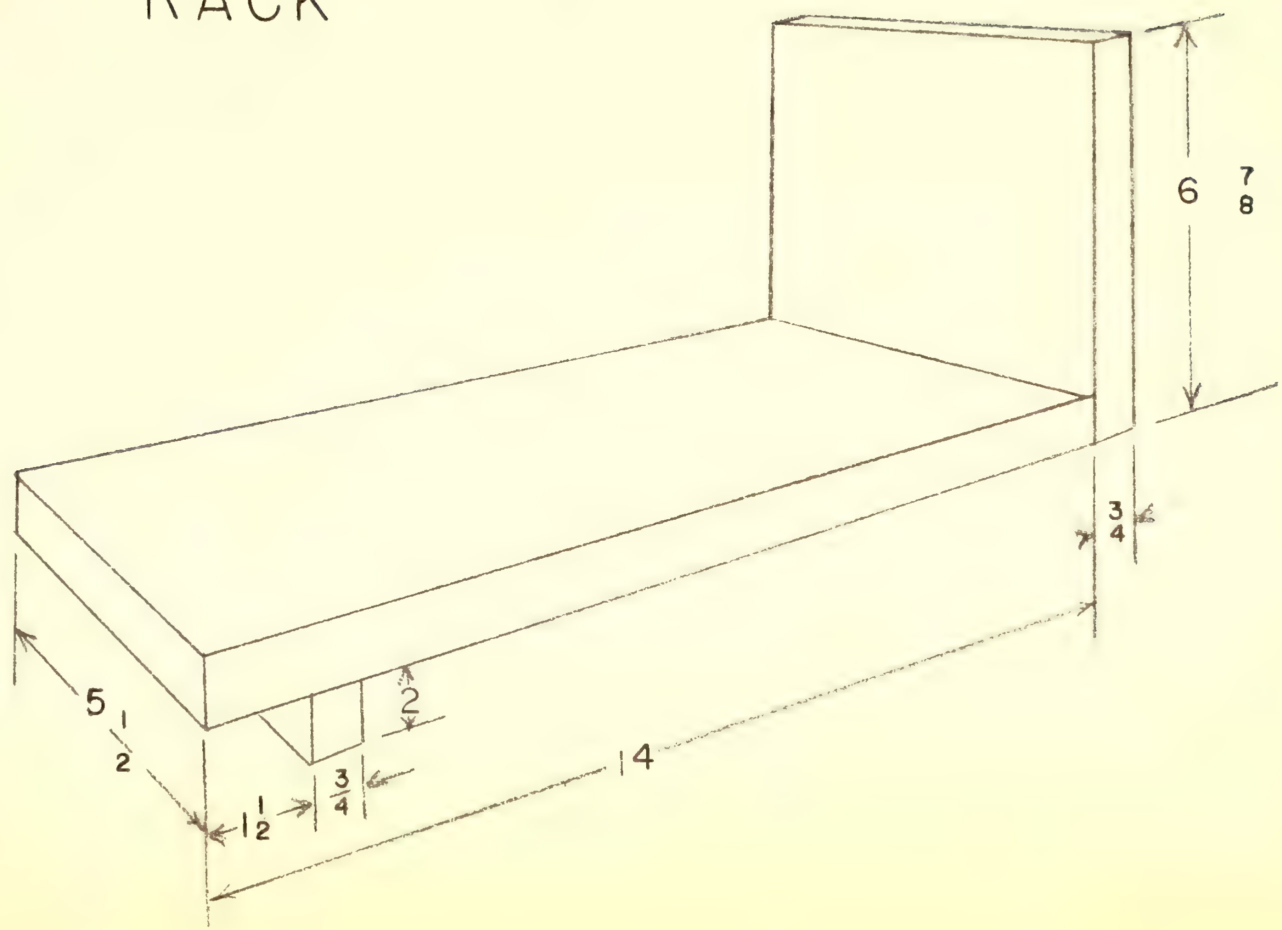
____

____

APPENDIX D

LESSON EVALUATIONS AND STUDENT PROJECTS

BOOK RACK



EXPERIMENTAL INSTRUCTIONAL EVALUATION

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
1. Orientation 2. Explanation of wood structure 3. Explanation of grain end, edge and face - how to cut and plane grain 4. Safety 5. Disassembly and assembly of book rack model 6. [illegible]	Lecture and demonstration	Perhaps too much involvement in wood structure - student became nervous. Should have let student make some practice cuts using different tools.	Student recognised common wo[illegible] and their use Student practiced using saw and nails Student indicated he prefers to work from a model rather than a drawing
	Special Aids or Devices Used Blocks of wood of various types Block wood with end grain split off Brush to explain grain structure Model of book rack Drawing of project		Student Reaction

EXPERIMENTAL INSTRUCTIONAL EVALUATION

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
1. Orientation to measuring devices	Demonstration	References to 'this' or 'that' or instruction such as 'hold it like a pencil' are not valid.	1. It is easier for a beginner to use a measure with a fixed marker such as the roll-o-matic. This can be referred to quickly without re-counting the dots.
2. Methods of marking wood		It is important to know exact names of the tool's parts so that direct references may be made.	
3. Sawing		The student must practice making one definite mark with the awl, otherwise there is a confusion as to the right one.	3. Sawing 1. Free hand along scratched line — very poor — student 1" off. 2. Try square as guide — better but no control of saw direction; angle. 3. [illegible] guide — [illegible] much [illegible] [illegible] 4. [illegible] [illegible] [illegible] [illegible] [illegible] room for gaining skill.
	Special Aids or Devices Used 1. All raised dot and braille devices. 2. Awl for making scratch line. 3. Methods of sawing used: 1. Free hand 2. Try square as guide 3. Special guide from AFB 4. Board clamped on line		Student Reaction

[illegible]

LESSON ACTIVITY	METHOD OF PRESENTATION	[illegible]	RESULTS
1. [illegible]cut 2. Square 3. [illegible] To layout with [illegible] framing square [illegible] square and work [illegible]	Explanation Demonstration [illegible]	Student had difficulty in clamping a block of wood on the [illegible]	Student did very well in adjusting the new [illegible] on the [illegible] line. Student [illegible] being square.
	[illegible] Aids or Devices Used A device was made from two wood rails fastened surface to surface with 3 inch bolts using a wing nut for tightening. [illegible] framing square		[illegible] Student pleased [illegible] using special j[illegible]

[illegible] ACTIVITY	METHOD OF INSTRUCTION	[illegible] & SUGGESTED CHANGES	RESULTS
Layout measure and cut stock to size with hand saw	Demonstration 1. How to set roll-o-matic 2. Transfer measurement to stock 3. Place saw guide over line 4. Check cut with try-square	The student tries to be a perfectionist in all things he does If he were encouraged to go ahead even though the project isn't perfect being instructed that practice makes perfect [illegible]	The student is gaining skill and confidence in measuring and sawing. He now has the three parts of the bookrack cut out
	Special Aids or Devices Used Roll-o-matic ruler Saw guide		Student Reaction Student likes the roll-o-matic ruler better than [illegible] rulers and squares.

88

V-5

[illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Planing Jack plane Block plane Different uses How to disassemble, sharpen and assemble the plane	Demonstration and participation **Special Aids or Devices Used** Edge planing guide (see photo)	Checking stock for square edge. Can use finger nail to check for gap or test by seeing if the try square rocks. It is hard to tell if plane is flat on the board. Because of uneven weight distribution, the tendency is to cut down too far on one edge. This can be counteracted by changing hands and shifting the body during alternate strokes. It was a problem for planing one end of a board by [illegible] going all the way [illegible] [illegible] [illegible]	Student found it hard to plane a square edge. The planing guide solves the problem. (See illus.) Had to judge area already covered when planing the [illegible]. **Student Reaction** Student found the Jack Plane was easier to use. The block plane did not give him an idea of his work.

89

[illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Sawing	Students hands were directed while teaching him the use of a new saw guide.	Saw guide had a tendency to slide on the stock. This could easily be changed by either clamping or cutting out a section where the left hand could grip both the guide and the stock.	
Planing end grain	Student used techniques taught during previous day. End grain protected from tearing by putting the [illegible] against another board in the vise.	Student has problem of putting constant pressure on the plane.	During the course of the lesson the student developed a great deal more skill in putting even pressure on the plane.

Special Aids or Devices Used

Saw guide - 12" board with a ridge to catch the far side of stock. On the end of the board is a mitered corner extending 3" up and across the face of the stock and 3" out and down the far edge of the stock (see photo)

Student Reaction

Student - "Today I really understand what I'm doing."
Student was extremely pleased with the new guide. He felt it was by far the simplest to use and the most accurate.
Student likes this method of planing end grain as it is not necessary to judge when he is at the middle.

[illegible] (CONTINUED)

LESSON ACTIVITY	METHOD OF INSTRUCTION	STUDENT [illegible]	RESULTS
Sanding	Sand with 2-0 sandpaper using sanding block.	The student sanded the edges round and out of square.	Student learned to control sandpaper creating a square edge.
Drilling with Drill Press	Explanation of machine components with student learning through participation	None. Student must remember to check all facets of the machine. On second try he forgot to reset the depth gauge and could not get drill through the wood.	The drill press presented no problems.
Screwing		Trouble with keeping the two boards straight while they were being screwed together. Finally placed one board flush on the table in the vise and screwed the other on to it.	No problem after [illegible] holding boards [illegible].

[illegible]

Sanding - none

Drilling - none

Screwing - none

Student Reaction

Student enjoyed being able to operate the drill press.

[illegible]	METHOD OF INSTRUCTION	[illegible]	[illegible]
Orientation to table saw: nomenclature function maintenance safety	Student was shown all components: their use, function, and how to remove or adjust. Safety features and techniques were stressed. Student examined all points including motor and belt underneath. It was stressed that the machine must be well cared for and that all parts function smoothly without catching or binding. Special Aids or Devices Used None	It is essential that the blind student learn the exact names of all parts of the machine and that the teacher always refer to them by name. This will expedite any safety instructions that must be given quickly. Before operating any machine both the student and instructor must be sure that the machine is unplugged.	Student gained a good understanding and respect for the machine. Student Evaluation Student was very [illegible]. He asked questions [illegible] his understanding of [illegible] previous [illegible] on the machine's [illegible] operation.

[illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED / ALTERNATIVE METHODS	RESULTS
Adjusting guides and squaring table with blade	With a piece of stock the student went through a dry run for both cross-cut and ripping. This showed him the function of the guides. He was shown how to measure the rip fence's distance from the blade by use of marked stock or braille rules.	None	Satisfactory
	Student was shown how he could square the table by [illegible] the ring of the blade when the square was placed against it and the table. The ringing sound will stop when the try square is flush against the blade and table.	Practice is required for him to be able to [illegible]	Satisfactory

[illegible]

The use of sound to check the square of table.

Braille rules.

[illegible]

[illegible]

LESSON ACTIVITY	[illegible] INSTRUCTION	[illegible]	[illegible]
Sawing – table saw cross-cut ripping	Student had previously been taught all aspects of the machine. Emphasis was now placed on positioning himself and his hands during both the cross-cut and ripping operation. In cross-cut right hand was kept in pocket and left hand on the [illegible] half of the [illegible] holding firmly on to the stock. With ripping right hand was hooked over the fence while holding the stock. [illegible]	There was a tendency for the student to reach out and check what he was doing with his free hand. Student must be made aware of the danger of checking while the saw is running. Placing free hand in his pocket helped solve this problem.	Excellent. Student had gained confidence and rapport. He should be able to work [illegible]
	[illegible] None		[illegible] [illegible]

94

[illegible] INSTRUCTIONAL EVALUATION

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED SUGGESTED CHANGES	RESULTS
Finishing (cont.)	Rub finish with steel wool and apply second coat of varnowax.		Wipe-on wood finish works very well.
Table saw (cont.)	Use of Brett Guard Remove circular saw blade	Student placed all four fingers on stock while cutting on jig-saw. Shown finger [illegible] should be in front of the saw blade and line guide.	
Operation of jig-saw	Adjust hold-down guard over stock on jig saw. [illegible] line guide [illegible] jig-saw. Change blade on jig-saw. Cutting irregular line on jig-saw, using line guide	Student forced stock on the jig-saw and didn't hold stock firmly on saw table.	After several practice cuts, the student could cut an irregular line within 1/8" of mark using the jig-saw and guide.
Introduction to [illegible]			

Special Aids or Devices Used	Student Reaction
Specially constructed jig-saw guide for blind operator	Student was nervous when using jig-saw. He preferred working on table saw.

LESSON ACTIVITY	METHOD OF INSTRUCTION	[illegible]	REVIEW
Woodfinishing (cont.)	Tell student to make sure the area is free of dirt before finishing.		Student did a good job of finishing. He said the only trouble he had was knowing whether or not he had covered the whole project.
Orientation of [illegible] A. Parts of machine B. Adjustments [illegible] 2. Operation	Safety - where to place only [illegible] Adjust table of jointer for depth of cut. [illegible] Use a push block. Check stock for nails and grain [illegible]	When joining a board, student wants to push stock over the top of the fence. [illegible] jointer [illegible] place [illegible] [illegible] to push stock into the fence, and [illegible] to hold the stock down. [illegible] [illegible]	Student eager to learn all about the power machines. He asked many questions pertaining to the motor size, pully, [illegible]. Student had [illegible] jointer trying to keep stock vertical and at right angle with fence.
	[illegible] **Instructions** None		**[illegible]** "How do you tighten [illegible]" "How big is the motor?" "Can you change pully to make it cut faster?" "The hardest thing about jointing is to keep stock vertical on edge." "The pusher resembles a [illegible]"

EXPERIMENTAL INSTRUCTIONAL EVALUATION

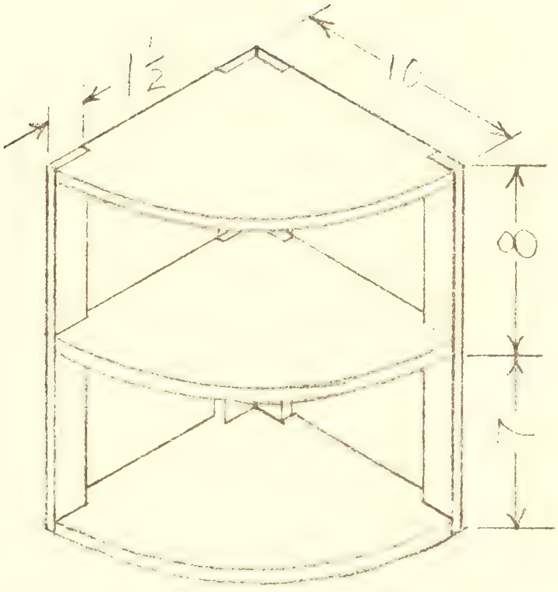
LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Introduction and practice use of band saw a. Orientation b. Operation c. Practice cutting	Describe and explain parts of bandsaw. Construction of machine. Use of machine. Cut on irregular line. Make a cut using [illegible] guide.	Student fumbles with his fingers when following a line. Only the index finger should be on the stock in front of the pointer on the line guide. Student tends to force stock and cut too fast. When he does this, he looses the line. Practice with instructor placing hands over student's hands helps to develop "feel" and proper movement of stock [illegible].	With practice, student becomes very accurate in cutting irregular lines using the line guide.
	Special Aids or Devices Used Line guide designed especially to cut irregular lines with bandsaw (see photo and diagrams).		**Student Reaction** "Band saw cuts better than jig-saw." "I have no trouble using the band saw." "The guide works very well."

EXPERIMENTAL INSTRUCTIONAL EVALUATION

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Cylinder turning on wood lathe	Demonstration on mounting stock between centers of lathe.	Difficult for student to cut diagonal lines and find center of stock.	
1. Explain use of lathe.		Locate centers of stock by placing blade of try-square flat on the end of stock and sawing diagonal lines 1/8" deep with back saw.	
2. Name parts of lathe			
3. [illegible]		Care must be taken that student keeps hand behind tool post. Gauge or tool must be fed into the stock slowly.	Student tries to cut too fast with tool.
	Demonstration on changing speeds of lathe.		
	Demonstration on measuring with outside calipers.	Student did well in making a uniform cut.	
	[illegible]		Student Reaction:
	Outside calipers		Mounting the stock was the hardest job. Cutting with a gouge is easy. "I enjoy working on the lathe once its lined up."

98

CORNER
SHELF



ALL STOCK $\frac{3}{4}$ THICK

[illegible] INSTRUCTIONAL EVALUATION

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Familiarizing student with basic measuring instruments. 1. Try square 2. Quick-o-matic 3. Steel square 4. [illegible] rule 5. Combination square [illegible] 1. [illegible] 2. [illegible]	Lecture and demonstration: 1. The student was shown each measuring device and the proper method of measuring. 2. Student used pieces of scrap of various sizes for measuring exercise. 3. [illegible] 4. [illegible] 5. [illegible] to use planes correctly.	Student had previous experience with basic hand tools. No problems encountered.	Student carried out all operations successfully.
	[illegible] Improvised cross cut saw guide		Student Reaction Interested. Showed good knowledge from previous experience.

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Student did not read the assignment for today. [illegible]	Question and answer.	Did not remember very much.	Uncertain
[illegible]	[illegible] drawing.	Understanding different views of his project [illegible] drawing. [illegible] the drawing.	Very good understanding of the drawings.
[illegible]	[illegible]	No particular problem.	Very good response to instruction - very [illegible]
[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]		Student Reaction
	Special hand saw guide		Very well pleased with his progress and experience

[illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
1. Student reviewed briefly assignment given on beginning problems in woodworking.	Lecture and demonstration: 1. The student was introduced to the band saw.	Student encountered minor difficulty in following arc scribed on material. Suggestions: 1. [illegible] on the band saw, make a notch at the edge where the student will make his initial cut.	While the student was cutting an arc close to the edge of the wood, the student moved off the scribed line and returned to resume cutting without injuring finger or even indicating major danger.
2. Making several trial cuts on the band saw.	2. The student made several trial cuts on the band saw following a scribed line on the material.	2. In finishing the cut keep the student [illegible] finger at least [illegible] before the cut is completed.	
3. Cutting out project material.	3. The student was allowed to [illegible] his project material.		
	[illegible] Special guard (see photo and diagram)		[illegible] Student seemed very pleased.

[illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Truing up uneven edges with wood rasp and abrasives, also by using block plane.	Verbal instruction about holding wood in vise and demonstration of using block plane.	Aligning edges to be smoothed. Wire brads used.	Satisfactory
Use of disk sander	Orientation to disk sander. Safety precautions stressed. [illegible]	Some problem in manual manipulation of [illegible] peculiar to [illegible]. [illegible]	Student did a satisfactory sanding job.
Smoothing with sand paper	Verbal instruction about importance of grain direction [illegible] applied.	No particular problem.	Satisfactory

Special Aids or Devices Used

None

Student Reaction

Student seems interested and is a good worker.

W2-5 [illegible] EVALUATION

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Project - corner shelves 1. Measuring and marking vertical supports 2. Cutting [illegible] 3. [illegible]	Lecture and demonstration: 1. Teacher showed student how to cut vertical supports. 2. Teacher and student set up table saw for cutting dado joints. 3. Student cut material. 4. Student continued material [illegible]	The student had some difficulty in cutting dado on rounded edge, but was able to complete the operation without spoiling his project.	Satisfactory
	Special Aids or Devices Used None		Student Reaction Interested

[illegible]

[illegible] ACTIVITY	[illegible] INSTRUCTION	[illegible] SUGGESTED CHANGES	RESULTS
Sanding Sand-papering parts before assembly	Demonstration in use of sand-paper and block.	No problem in sanding but errors in notched cuts appeared. Suggested re-cutting.	Satisfactory
[illegible]	[illegible]	[illegible] problem	Satisfactory
[illegible]	[illegible]	No problem	Satisfactory
[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

None

Student Reaction

Satisfactory

105

[illegible]

ACTIVITY	METHOD OF INSTRUCTION	DIFFICULTIES ENCOUNTERED & SUGGESTED CHANGES	RESULTS
1. Operating the drill press 2. [illegible] 3. [illegible]	Demonstration and lecture: 1. Holes were laid out and punched before class time by instructor. 2. The student set up the drill press for boring [illegible] 3. [illegible] 4. [illegible] (final assembling)	The student did not encounter difficulty in setting up the drill press or locating the punched points for boring. Suggestion: [illegible]	Boring and assembling operations were very satisfactory.
	[illegible] None		Student Reaction Student was very pleased.

W2-8

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Related information about finishes	Verbal explanation about origin of lacquer. Question and answer.	Student's memory not good, or he did not read text.	Unsatisfactory.
Preparing the assembled project for finishing. Countersinking screws.	Instruction in use of block plane and hand drill with countersink. Also some review in determining state of rest of power sander.	Numerous uneven joints to be smoothed up. Problem of holding corner shelf in vise. Remedied by using hand screw to hold shelf and using vise to hold hand screw. Used scrap of wood to determine state of rest of sander. (Dick)	Fairly satisfactory, but not up to expectations.

Special Aids or Devices Used

No special devices used.

Student [illegible]

Student's interest [illegible] lower than usual.

[illegible]	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
[illegible]	[illegible]tration and lecture: 1. [illegible]e instructor read the [illegible]rect method used in [illegible]plying sealwall. 2. [illegible]e student applied the [illegible] coat. [illegible]e instructor discussed the [illegible] and function of the [illegible] with the student. [illegible]e student went over the [illegible] part by part and [illegible]iliarized himself with [illegible].	No special problems encountered.	Satisfactory.
	[illegible] side or Design Board None		[illegible] Student was very [illegible]

EXPERIMENTAL INSTRUCTIONAL EVALUATION

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	[illegible]
Familiarization with and actual use of various cutting tools on the wood lathe.	Verbalized instruction in conjunction with demonstration.	How to bring cutter into contact with turning wood safely. Take firm correct hold and move slowly.	Satisfactory use of [illegible] for roughing out but [illegible] practice.
Mounting stock between centers	Careful instruction of procedure with teacher's hands on student's during demonstration, student noting each move by touch.	No problems.	Satisfactory.

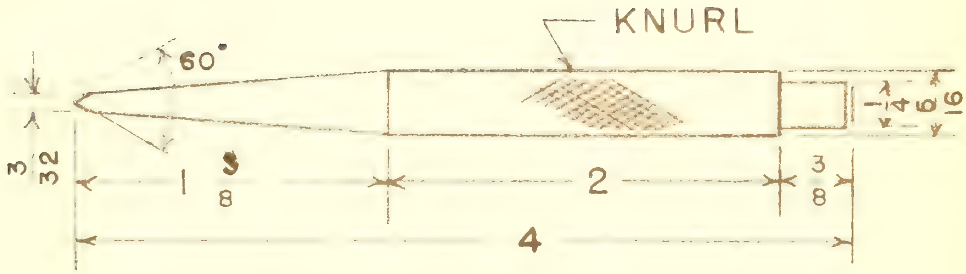
Special Aids or Devices Used	Student Reaction
None	Student's interest [illegible] [illegible]. Said he [illegible] much of the lathe.

No. 11

EXPERIMENTAL INSTRUCTIONAL EVALUATION

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Wood turning Applying second coat of varnowax Roughing with the gauge Smoothing with the skew chisel	Lecture and demonstration: 1. The student applied second coat of varnowax. 2. Roughing was done with the gauge by the student. 3. The student smoothed and sanded material while rotating in the lathe. 4. Each operation was explained to the student as he progressed.	The student performed all operations without encountering any major difficulties.	Satisfactory
	Special Aids or Devices Used None		Student Reaction Student was very pleased

CENTER
PUNCH



DESIGN MAY BE MODIFIED

M3-1 [illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Orientation to machine lathe	Same as M1-9 and M2-9	Judging the depth of cut and measuring will be a problem. No specific measures were taken at this time because student was merely learning the use of the machine.	Satisfactory
	[illegible]	It is important for the blind student to wear goggles if he is going to [illegible] by touch. To feel the cutting tool contact the stock requires placing the hand in such a position that will allow chips to fly into the eye.	[illegible]
	None		Student had no fear of the machine.

112

[illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Lathe operation 1. Chucking and facing end of roundstock	Demonstration: Yesterday instructor showed student how to do this operation. Today student did it on his own	No problems	Satisfactory
2. Turning between centers	Same as No. 1	Trouble getting the tool at right angles with the stock He used the head of the combination square	Satisfactory
3. [illegible]	Demonstration. Teacher showed student how to set up to cut tapers and how to proceed. Then student went ahead on his own.	No problems	Satisfactory
	Special Aids or Devices Used Stop on horizontal bed not used but needed		Student Reaction

73-3

EXPERIMENTAL INSTRUCTION EVALUATION

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
The machine lathe as a previous tool Introduction to measuring devices Click-o-matic Calipers Micrometer	Operation of measuring device was shown. Practice measurements were made by the student.	Student tried to count the clicks of the click-o-matic but found that it was hard to control so that measurement might be lost. After practice he felt the auditory method was superior to the manual. On combination inside and outside calipers it was hard to remember which [illegible]	Satisfactory
	Special Aids or Devices Used Click-o-matic rule Braille calipers		Student Reaction It's hard to read the graduations (16ths) [illegible] the click-o-matic.

EXPERIMENTAL INSTRUCTIONAL EVALUATION

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Orientation to shaper	Orientation was demonstrated with student manipulating controls and feeling movement.	It was difficult for the student to stop the machine on the back stroke. The shaper must be put into low speed for this to be accomplished.	Excellent. There is no appreciable problem involved with the blind using either the shaper or the [illegible].
Setting up stock and adjusting stroke	Student was shown how cutting tool must clear the vise and that the stroke must give enough clearance for the [illegible] to drop back to the [illegible] position.	No problems.	
Orientation to surface grinder [illegible]	Student placed the [illegible] on the chuck and then without [illegible]	It was difficult for the student to tell when the grinder was barely touching the metal. By hand [illegible]	

Special Aids or Devices Used

None.

Student Reaction

The student enjoyed working on both machines. [illegible] at all afraid of them. [illegible] needs to learn a little [illegible] respect for them.

ID-5 [illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	[illegible] & SUGGESTED CHANGES	RESULTS
Milling machine	Student was shown operation and practiced making various [illegible]	Setting stock so that it is cut at exactly the right spot. The circular [illegible] [illegible] [illegible]	Satisfactory
	[illegible] None		[illegible] Satisfactory

116

[illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Continuation on milling machine Safety Approach to sur- [illegible]	Four point approach to the machine was introduced and practiced. [illegible] None	No problems with either machine.	Excellent Student Reaction Technique gave the [illegible] confidence and [illegible] the respect he must have for the machine.

[illegible] INSTRUCTIONAL EVALUATION

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Constructing paper weight			
a. Reading raised line drawing of project	Raised line drawing of project reviewed with student to establish dimensions.	None	Excellent
b. Cutting [illegible] with power [illegible]	[illegible]		
c. [illegible] in lathe for [illegible]	[illegible] retention of previous lesson. Questions on major points.	None	Very satisfactory. Student retained material from previous lesson well.
	Special [illegible] Used		Student Reaction
	Raised line drawing kit		Student enjoys making paper weight and seemed to be able to handle machines by himself.

118

[illegible] INSTRUCTIONAL EVALUATION

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Milling Machine Completion of project	Student assuming responsibility for operating the milling machine and the shaper. This was done to evaluate previous instruction.	None	Student was able to finish his project on the two machines with minimum assistance from the instructor.
	Special Aids or Devices Used None		**Student Reaction** Student was quite pleased and feels that he can adequately operate these machines.

EXPERIMENTAL INSTRUCTIONAL EVALUATION

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Construction of a can. sheet-metal	Teacher previously prepared examples of each step of procedure. Teacher explained to student each machine to be used and the process that will be accomplished.	Problem of adjusting the depth gauge on the bar folder. Solution: Making practice settings with scrap material.	Satisfactory
1. Cutting sheet-metal on bench shear.	″	No problems	Satisfactory
2. Making seam with bar folder	″	No problems	Satisfactory
3. Forming metal on forming rolls	″	No problems	Satisfactory

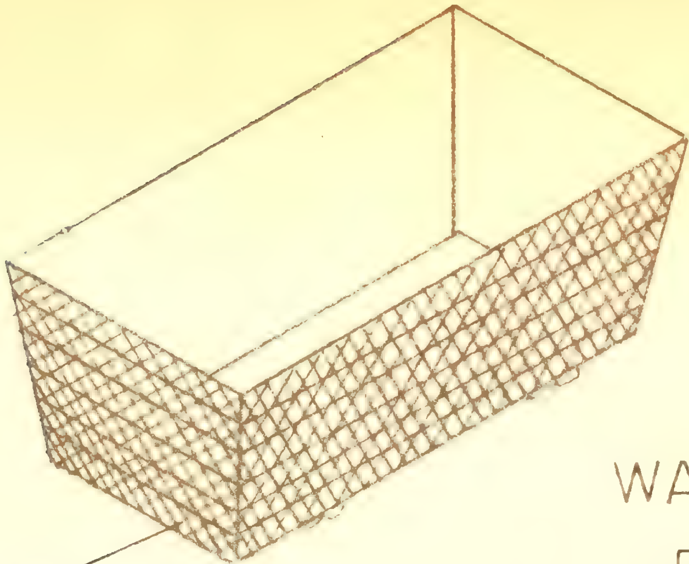
Special Aids or Devices Used

Click-o-matic rule

Braille rule

Student [illegible]

Student enjoys working with sheetmetal.

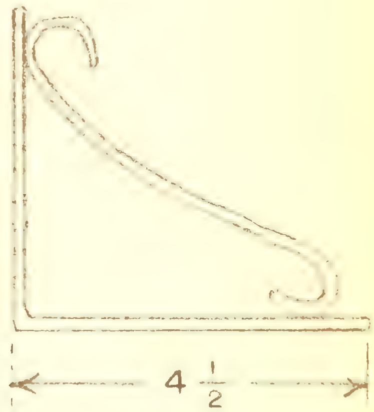


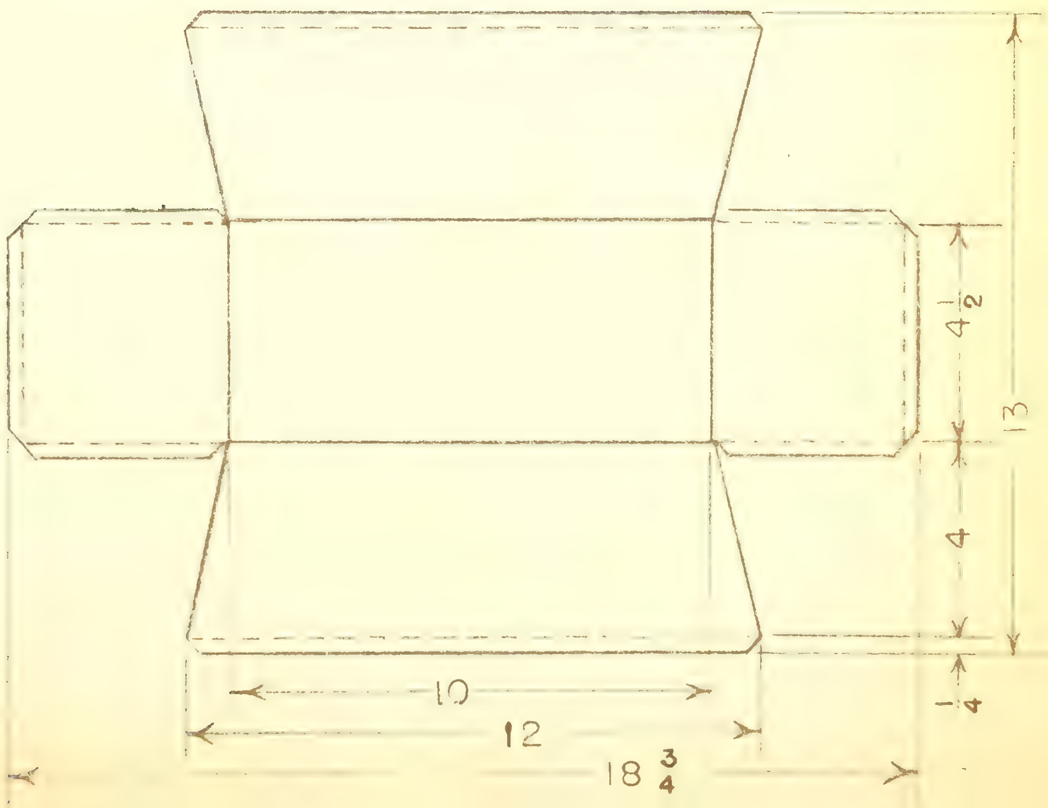
EXPANDED OR
STAMPED METAL
- 3 SIDES -

SPOT WELDED

WALL PLANTER

SHELF BRACKET





[illegible]-1 [illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED * SUGGESTED CHANGES	RESULTS
Wrought iron shelf bracket	Demonstrations and lectures on related information Demonstrations- How to use the raised line drawing kit Layout of scrolls and transfer of pattern to a wire for measuring and bending How to use a hack saw Bending of wrought iron Related Information- General information on the metal, wrought iron-carbon removed, used in ornamental iron work, etc. [illegible] available sizes, etc.	Marking metal to size using braille rule. Suggested changes - Sliding rule from distance desired and marking at one inch end of the rule the line to be drawn. Student had tendency to bend metal too fast on bending jig.	The results of the raised line drawing helped greatly in the transfer of the idea of the project design to the student. The results were good in regard to cutting the metal. Bending the metal to a ninety degree angle was successful. Bending the metal more slowly will help the student in forming the design.
	Material Aids and Devices Used Braille rule Braille try square		Student Reaction

122

[illegible]

[illegible] ACTIVITY	METHOD OF INSTRUCTION	[illegible] & SUGGESTED CHANGES	RESULTS
Riveting cold metal	Measuring and layout. Clamp material in vise so that line that is to be [illegible] will fall at the edge of the vise. Use center punch. [illegible] - 1. [illegible] 2. [illegible] 3. [illegible] Safety rules.	More accurate marking system for centering. Changes - [illegible] used as a marking gage. [illegible] Change - [illegible] [illegible] 1/8" - 3/8" [illegible] Changes - We found students to be very [illegible] in [illegible] center. [illegible] used.	All operations were very successful. Note: Student had some previous [illegible] on drill press.
	[illegible] on Designs Used		Student Reaction

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
1. Riveting (cont.) 2. Aligning holes and setting rivets	Demonstration and related information Demonstrations - 1. [illegible] material using center punch [illegible] Use of drill press 2. Aligning holes for rivets 3. [illegible] set [illegible] 4. [illegible]	Getting holes in line for rivet. Suggested change: Use awl or other sharp device to locate holes. All operations in setting rivet were completed with little difficulty.	Student has working knowledge of using rivets for joining two metals.
	Special Aids or Devices Used No special adaptation was necessary		[illegible] Student pleased with results

LEARNING ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS AND SOLUTIONS & SUGGESTED CHANGES	RESULTS
Complete all riveting operations	The student was given all necessary information to complete the riveting process.		
Finishing cold metal (paint)		Problem - Paint runs when brush is brought at a right angle to the work. Suggested change - Paint from one end to the other end of band iron. Problem - complete coverage of paint [illegible] Solution - After completing the painting of project a second brushing will insure complete coverage.	Student had good difficulty keeping paint from running.
	Special Aids or Devices Used: None		Student Reaction: After completing the painting the student commented [illegible] definite sense of [illegible]

-5

[illegible] ACTIVITY	METHOD OF INSTRUCTION	[illegible] & SUGGESTED CHANGES	RESULTS
Sheet Metal Project-planter box	Demonstrations, lectures and related information. Lectures and related informa- tion Introduction to sheet metal Employment [illegible] workers Kinds of sheet metal, etc. Layout of project pattern, [illegible] Transfer of pattern to metal	Getting a mental picture of the finished box was accomplished by folding paper and scrap pieces of metal. Marking the metal with a scriber [illegible] was [illegible] on metal. The student was able to use point of scriber and to mark accurately [illegible] of an [illegible] [illegible] the outer edge of the metal [illegible] and square [illegible] over end of bench, thus making it [illegible] for the student to [illegible]	The results were good. The student is [illegible] can easily [illegible] Very good results. [illegible] end of bench.
	Special [illegible] Braille Rule Raised Line Drawing Kit Clay Drawing Kit		Student [illegible] Liked idea of project [illegible] is anxious to continue.

[illegible]

[illegible] ACTIVITY	[illegible] INSTRUCTION	[illegible] CHANGES	[illegible]
Layout of Sheet Metal (cont.) Cutting sheet metal with metal snips.	Demonstration and related information Demonstrations: 1. How to use straight snips 2. How to use the squaring shears	The student had some trouble in aligning snips to the metal. He had a tendency to move the snips off the line as he cut. Suggested scratch awl be used along with snips in starting the cut. As the cutting progressed, it was found that if the snips were raised to and aligned with the line to be cut, it worked well.	For never having used the tin snips before, the student did very well. Student learned quickly how to use the squaring shears. The student is not [illegible] to finish the project [illegible] laying them.
	Special Aids or Devices Used 1. Scale rule and scratch awl 2. Large flat metal magnets were used to hold metal flat in layout work.		Student [illegible] "O.K. I think I'll [illegible]"

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Cutting sheet metal (cont.)	Demonstration and individual help 1. How to cut a straight line using the straight snips	1. Student was able to cut a straight line, but had considerable trouble in starting a new cut. Found if the edge of the metal was filed where the line was, he could start a cut much easier.	1. Very good and encouraging for both student and instructor in finding [illegible] to use snips well.
Bending planter box on bar folder	Demonstration of machine. Setting bar folder for depth of joint. 1. Student center the stock with awl. 2. Insert the stock to set depth of lock. 3. Bend metal. 4. Flatten hand for lap line. 5. Bend all other sides and [illegible]	1. Student must mark lines so he feels the line. 2. Care must be taken by student to hold stock straight in bar folder. Student can check this by moving stock back and forth until it feels even to him. 3. [illegible] of [illegible] could not be bent on folder, so student used stake and formed [illegible]	1. Satisfactory 2. Very satisfactory 3. [illegible] few.
	Special Aids or Devices Used Braille Rule Magnet to hold metal		Student Reaction "Fine. I think it's [illegible]"

[illegible]

[illegible]

[illegible] ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Spot welding (planter box)	Demonstration of welder a. Determining duration of welding for best results b. Align points of welder tip c. Insert project into welder and align joints to be welded d. Weld with timer switch	Problem - Spot welder moved about the bench. Was very difficult to control even for sighted. Solution - [illegible] machine to bench. [illegible] foot lever to bring welder tips together	Student did quite well considering the [illegible]
Soldering	Demonstration a. Lighting [illegible] b. [illegible] c. Applying [illegible] to tip of copper d. [illegible]	Problem - [illegible] joint was completely [illegible]. Solution - [illegible] to tip of iron and [illegible] the joint	Very good

[illegible]

No aids used

[illegible]

Student said [illegible] and solder all [illegible]

LESSON ACTIVITY	[illegible]	[illegible] & SUGGESTED CHANGES	RESULTS
Finish work on perforated metal cover for planter box.	Demonstrations 1. [illegible] box and pan brake. 2. [illegible]	No problems in use of box and pan.	Very successful
[illegible] perforated metal, [illegible]		No problems.	Very successful
[illegible]	[illegible] 1. [illegible]	[illegible]	[illegible]
	[illegible]		Student reaction [illegible]: "It's great."

130

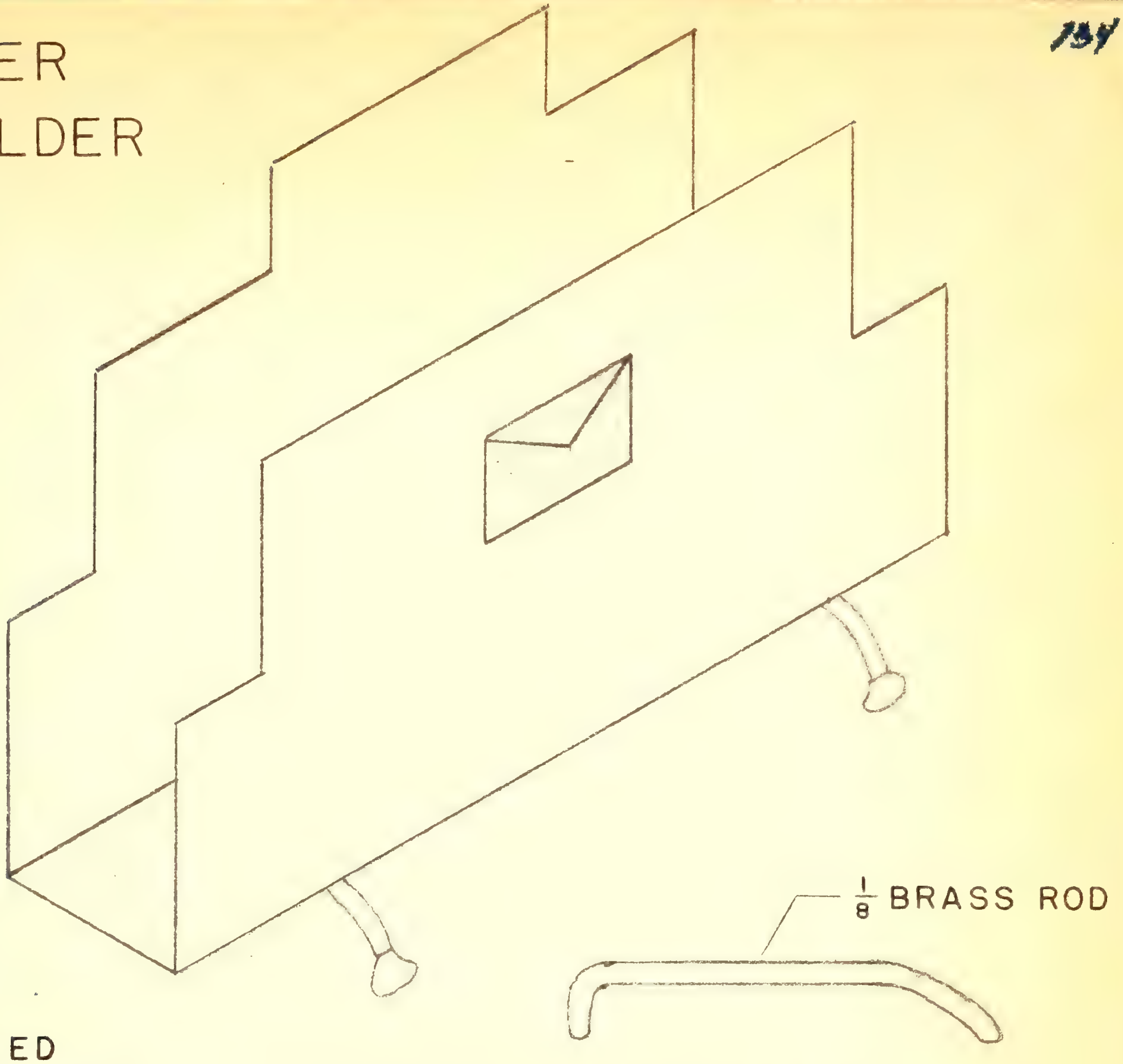
[illegible]	[illegible]	[illegible]	REMARKS
[illegible]	Student was given stock to practice on. Object - to let student [illegible] the feeling of the lathe and [illegible]	None	Student gained experience with every operation. All cuts, shoulder, [illegible], etc. were very [illegible].
	[illegible]		Student Reaction
	[illegible]		"This is easy". He felt that he could handle the machine after the demonstration and practice session.

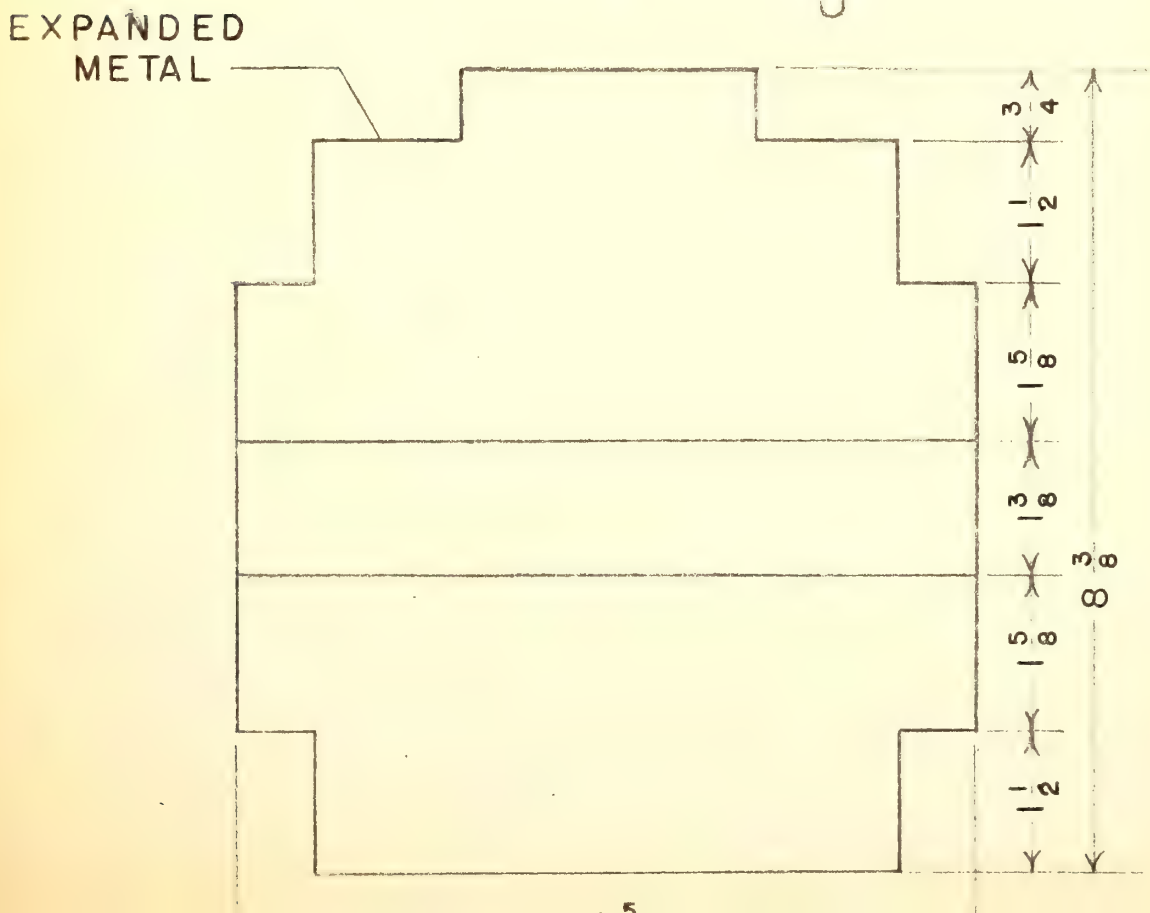
[illegible] INSTRUCTIONAL EVALUATION

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Mounting stock and cutting square shoulder on the metal lathe. Use of [illegible]	Demonstrations: 1. How to cut a square shoulder on the metal lathe. 2. How to use the [illegible] of the metal lathe. 3. [illegible]	Student wants to let his right thumb touch the work, where the bit is cutting. This could be dangerous if small chips of metal went into his hand. The student was told to let his index finger [illegible] into the [illegible] of the [illegible].	Very good
[illegible]			Student Reaction The student said, "I like to work with machine tools."

[illegible] ACTIVITY	[illegible] INSTRUCTION	[illegible] & SUGGESTED CHANGES	RESULTS
Metal lathe (Review)	Student demonstrated: 1. Putting stock in machine 2. Choosing cutting tool 3. [illegible] 4. [illegible], shoulder [illegible] 5. Adjusting [illegible]	Student had to use trial method in using dog for folding stock. [illegible] lever on feed wheels.	Practice will bring desired results. [illegible] may bring results.
[illegible]	[illegible] 1. [illegible] 2. [illegible] 3. [illegible]		
[illegible] turning	[illegible]		
	[illegible] Raised dot micrometer		[illegible] Student felt the operations of turning stock down to desired size was too slow. He was impatient with [illegible]

LETTER HOLDER





[illegible] [illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Construction of letter holder from sheet metal	Demonstration and related information - cutting to straight line using tin snips - use squaring shear - layout and marking metal - filing metal - safety	Cutting off at end of sheet Need for turning sheet as cuts are made Need to watch student stance Knowing when to stop cut clarified by counting perforations in metal	All operations satisfactorily performed.
	Special Aids for Devices Used Large tin snips Braille rule and try squares Perforated sheet, metal used to aid student in layout and cutting		Student [illegible]

[illegible]

[illegible]

[illegible] ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Filing	Demonstration with student's [illegible] on instructor's [illegible] or folding file.	Showing when small nibs were filed off. [illegible] by different feel of file [illegible]	Satisfactory.
Remove [illegible] from filed edge.		[illegible] file at angle.	
To [illegible] with special [illegible]	Click-n-[illegible] rule also explained.	[illegible]	[illegible] 1/16" [illegible]
[illegible]	Measuring [illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]		[illegible] achieved.
Using [illegible]	[illegible]	First cut [illegible]	Acceptable.
	[illegible]		[illegible]
	Click-n-[illegible] 12" rule.		Student's interest [illegible]
	Regular [illegible] square used to check angle of leg.		
	Allowing student to examine while explanations [illegible]		

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]
1. Final straightening and fitting of legs to [illegible]	1. Supervised trial and error	1. Flattening top side of [illegible] leg for better solder joint. Two flat [illegible] boards used to hold leg [illegible] [illegible] surface.	Satisfactory
2. [illegible]	2. Demonstration, orientation, and explanation	2. [illegible] bending. [illegible]	Very satisfactory
3. [illegible]	3. [illegible] explanation	3. [illegible] $90°$ [illegible] squared up by using [illegible] and [illegible].	Satisfactory after some practice
4. [illegible]	4. [illegible] and trial [illegible]	4. [illegible]	[illegible] necessary on the [illegible]

[illegible]
Vise grip clamps

[illegible]
Student reaction was [illegible] about learning to solder

[illegible]

[illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Lighting gas furnace	Orientation by touch using cold furnace and explanation of procedure.	Fear of flame jumping out and burning. Initial fear overcome by successful lighting.	Successful
Using vise grip to hold parts in place for soldering	Trial and error or practice	Minor problem of aligning parts - soon overcome. Also problem of [illegible] metal carrying away heat. Remedied by supplementing propane torch.	Successful with help of instructor.
Using propane torch for soldering or [illegible]	Practice in lighting and [illegible] of torch by touch.	Real problem of [illegible] a hot flame by a combination of touch and hearing	
[illegible]	[illegible]		

Special Aids or Devices Used

None

Student Reaction

Partially successful. Student feels he might learn to use this torch. Feels [illegible] much more about it. Some fear remains. Help was necessary.

138

[illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Lending perforated sheet metal to shape	Simple explanation of what was to be done was all that was needed.	By now he uses the hand-operated bench shear without much of a problem. Some final shaping by file found necessary.	Successful
Locating holder on vase	Student counted geometric perforations without trouble.	No problems	Successful
Cleaning project for painting	Instruction in use of emery cloth	Copper offered the usual problems.	Student "likes to paint."
Soldering envelope in place using propane torch	Holding cables in place with a weight near edge of brick [illegible]	Some problem of bringing flame to object, but with notable improvement. [illegible] straightening sometimes required.	Adjusted the flame to sound very well. Noted [illegible] allow cooling time.

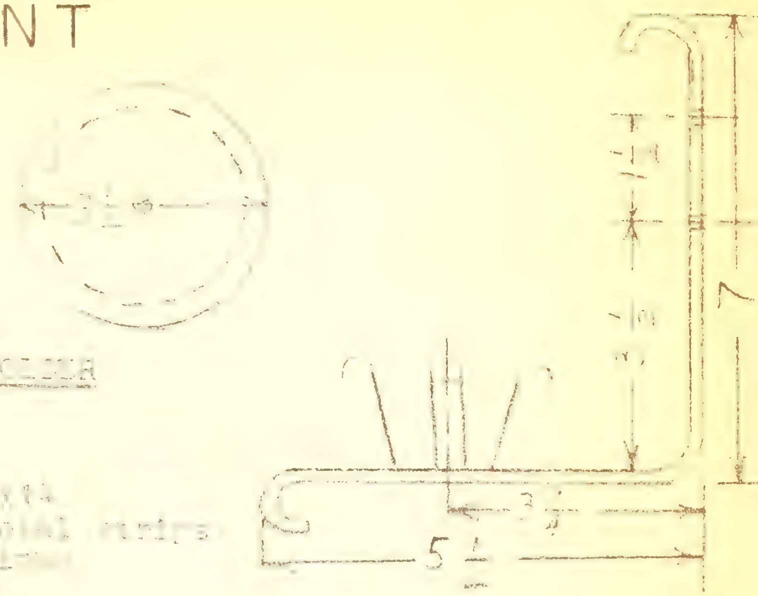
Special Aids or Devices Used

No specialized aids were used.

Student Reaction

Seems more interested in the work.

POTTED PLANT HOLDER



DIRECTIONS FOR MAKING PLANT HOLDER

Equipment:

1 piece strap iron [illegible]
2 " 16 ga. [illegible] metal strips
1 " tinplate or aluminum [illegible] in diameter
2 3/4 rivets 1/8 dia.

Procedure:

1. Drill 1/8 holes in metal strips as indicated.
2. Bend 1/2 x 1/2 strap iron to 90 degrees.
3. Bend ends of same piece around a ½" metal rod to form curl.
4. Bend 16 ga. strips as shown.
5. Rivet thin strips to strap iron to form holder
6. Cut circle of tinplate to 3½ diameter.
7. Drill 1/2 hole in center of tinplate.
8. Make decorative punches around edges of tinplate.
9. Rivet circle to upright portion of strap iron.
10. Paint all except tinplate with dull black paint.

[illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Painting with a brush	Lecture on importance of protecting metal from elements. Go through acts with dry brush	How to be sure all surface is covered. Suggested overlapping strokes. How to keep paint off hands.	Satisfactory
Student started new project consisting of wall flower pot bracket.			
Verbal explanation of new project (Flower pot holder)	Draw a mental picture through words	Inability to fully communicate, through spoken language, an idea.	Fair
Introduce raised line kit [illegible]	Demonstration and participation	Difficult to understand a working drawing in such a short time.	Satisfactory

Special Aids or Devices Used	Student Reaction
Room for painting Raised line kit	Tolerated paint and seemed glad to be finished. Wanted to know the "whys" of the drawing kit and paper.

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	REMARKS
Lay out	Demonstration and participation	Measuring 7/8" with 12" rule. Overcome by using framing square	Satisfactory
Selecting and [illegible] materials 1. Measuring	" "		
2. Cutting with [illegible] saw	" "		
3. [illegible]	Demonstration	[illegible] not have sufficient guide lines for [illegible]. [illegible] through [illegible]	[illegible]
4. [illegible]	[illegible]		
5. [illegible]		[illegible]	

Adapted Tools or Devices Used

[illegible] Rule

Raised Dot Rule

Raised Dot Framing Square

Student Interest

Student likes project and enjoyed using the [illegible]

[illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Check lay out			Satisfactory
Cut circular disk with tin snips	Demonstration – showing student by touch how material needs to be turned as cutting is done	Heavy mark that may be seen by blind is difficult to scribe.	Metal too heavy galvanized for easy cutting. Place [illegible]. Cut [illegible] with aviation snips not [illegible].
Cut second piece with [illegible]	Demonstration – showing student principle parts and made practice cut on scrap with student's hands following through.	Graduations need to be in raised dot. Difficult if not impossible to locate center with a ruler.	Satisfactory
[illegible]	Explanation – Student not able to finish operation.	[illegible]	Satisfactory
[illegible]	Demonstration and explanation	[illegible]	[illegible] in proper place.
	Special aids or devices used		Student reaction
	Raised dot combination square	[illegible] magnetic holding [illegible] might be used to hold materials	Before starting student said, "It's impossible to make circular cut with tin snips."
	Raised dot framing square		

MA-9

[illegible]

[illegible] ACTIVITY	METHOD OF INSTRUCTION	[illegible]	[illegible]
Riveting with flat head rivet	Lecture. Gave student rivet and explained alignment and how the set could be used to pull materials together before riveting. Showed student how to rivet.		Satisfactory
Riveting with round head rivet	Explained how round head rivet could not be flattened.	Two sets had to be used so head would not be deformed. One set held in the vise while setting with the second.	Satisfactory
Orientation on machine lathe	Explanation of each part as hands are placed on that part. [illegible]	Student knew nothing about machine lathe and was somewhat afraid. This disappeared with instruction.	Satisfactory
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]		[illegible]	
[illegible]	Special Aids or Devices Used None	[illegible]	[illegible] Student [illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUCCESSES ACHIEVED	RESULTS
Horizontal cut on round stock using the engine lathe	Review of instruction given the day before	Student has tendency to touch too fast.	Satisfactory
[illegible] adjustment		Student discovered that the material had sprung away from the tool bit. Second cut was made.	Some difficulty
[illegible]		[illegible]	Some difficulty
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	Satisfactory
	[illegible]		[illegible]
	[illegible]		Student is eager to use the lathe.

145

EXPERIMENTAL INSTRUCTIONAL EVALUATION

LESSON ACTIVITY	METHOD OF PRESENTATION	PROBLEMS ENCOUNTERED SUGGESTED CHANGES	RESULTS
[illegible]tting compound [illegible] 6° tapes on [illegible] table.	An attempt was made to explain the use of the compound rest and allowing student to feel each move.	Understanding this method of cutting tapers. This problem eliminated after a few explanations.	Compound was set but not without help.
[illegible] for [illegible]	[illegible] uniform feeding and [illegible]	[illegible]	Gave good [illegible]
[illegible]	[illegible]	[illegible]	[illegible]

None

Student appeared to be intensely interested in this work.

146

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Making finish cut for center punch	Simple review in method of bringing cutter in contact with work. Related information about manufacture and processing of ferous metals.	1/4" or less diameter seems to present high degree of danger when using touch method for following work. End of cut difficult to detect by hearing on light cut.	Successful
Making straight cut to a ridge of a groove	Student needed no special instruction—just told to stop carriage short of same.	Student's pants touched crossfeed knob and changed depth of cut. Have student stand back to clear knob.	Successful—dug into shoulder at first.
Using micrometer to measure diameter	Braille micrometer shown and explained.	No special problem.	Student has fair understanding of micrometer. More practice needed.
Cutting 1" taper on [illegible] end of center punch	Compound was set and verbal instructions given. Student [illegible]	No problem.	Successful
Filing point on center punch while [illegible]	Shown how to hold and stroke file.	[illegible] in using file. Some practice will help.	Satisfactory
[illegible]	[illegible]	[illegible]	Successful
	Special Aids or Devices Used		Student Reaction
	Micrometer with raised dots		

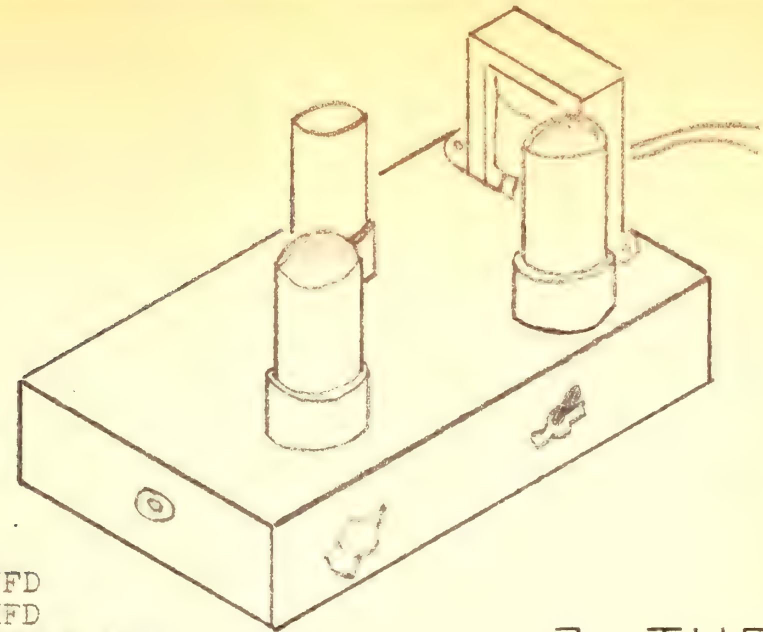
A1-13

[illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Center drilling	Instructed student in using center punch and mallet.	Bell center punch can be used to good advantage on round stock.	Satisfactory
[illegible] using dog and [illegible]	Showed student the proper [illegible] by himself.	None	Satisfactory
[illegible]	[illegible] student.	[illegible] should be used. [illegible]	[illegible]
[illegible]	[illegible]	[illegible] running the [illegible] stock [illegible] round stock [illegible]	[illegible] student [illegible] not know his lathe [illegible]

Special Aids or Devices Used	Student Reaction
None	Student has doubtful reaction. He likes the lathe but would like to start something else. He is tired of the lathe.

148

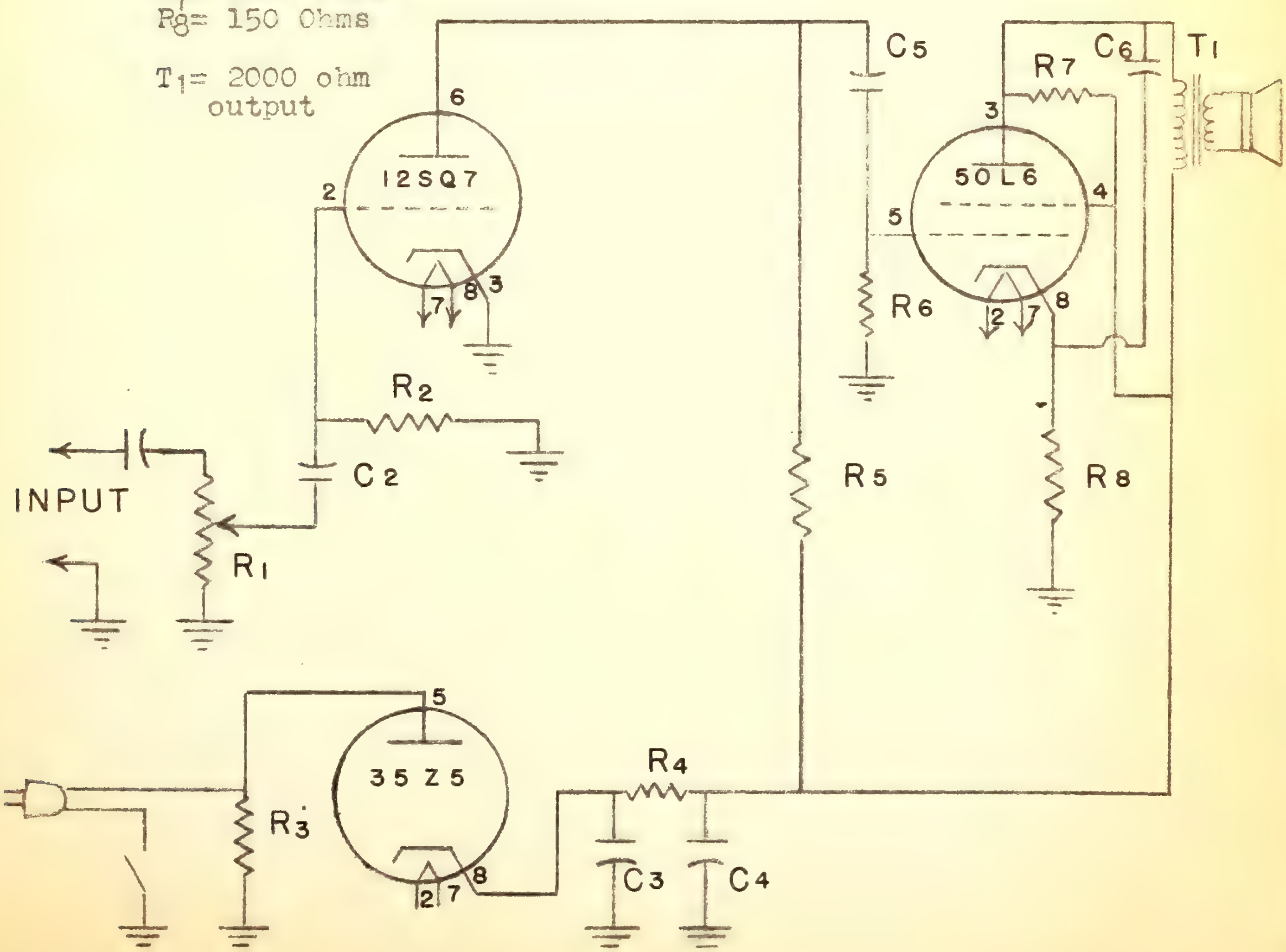


3 TUBE AUDIO AMPLIFIER

C_1= .01 MFD
C_2= .01 MFD
C_3= 30 MFD @ 150v
C_4= 50 MFD @ 150v
C_5= .01 MFD
C_6= .001 MFD

R_1= 500 K pot.
R_2= 3 meg.
R_3= 200 ohms, 10 watt
R_4= 1500 ohms, 2 watt
R_5= 100 K
R_6= 500 K
R_7= 2000 ohms
R_8= 150 Ohms

T_1= 2000 ohm
output



[illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Evaluation of student to find out what he knows about electricity Story of the electric circuit.	Questions, lectures, discussions, and demonstrations [illegible] None	Difficulties of getting the student to understand the flow of current.	The student knows about the dry cell battery. The student learned about series and parallel circuits. Student Reaction The Student was very interested in finding out about electricity and how it works.

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Review of magnetism and study of hollow cored coil.	With SE-2 kit used one battery, hollow core coil and a magnet to demonstrate.	None	Student was left with problem to solve. With two identical pieces of metal - one a magnet, the other an ordinary piece and asked how he would tell difference.
[illegible] hollow core coil	[illegible]	[illegible] to pile wire for the core [illegible]	Satisfactory
Testing coil	Student [illegible]	None	Soft core acted as plunger and result was satisfactory.
	[illegible]		Student reaction
	None		Satisfied with results.

#3-3 [illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Constructing a door chime	Lecturing and demonstration		Student had good coordination with screwdriver.
Soldering	Student performance with guidance.	Student had fear of soldering gun at first but this was gradually overcome with use.	Student able to solder a joint.
	Special Aids or Devices Used		Student Attitude
	Dime Soldering Clamp		Student was very interested in all the experiments.

152

[illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Study of magnetism	Discussion with aid of [illegible] magnet with a bell. Also discussed [illegible] and [illegible].		Student seems to understand magnetism.
Study of circuits [illegible] double [illegible]	[illegible] Connect [illegible]	Use of the kit has the disadvantage that the parts do not hold solid. Parts move and are confusing to [illegible]. [illegible]	Student has some difficulty understanding circuits.
	Special Aids or Materials Used		[illegible]
	None		[illegible]

153

E3-5 [illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Testing resistors with circuit analyzer	Lecturing 1. How to operate circuit analyzer 2. How to find the null	None	Resistor testing was successful.
Wiring a bell so it will ring with a switch	Lecture and demonstration on procedures in connection to the [illegible] of power.		Wiring door bell was successful.
[illegible]			
[illegible]			
[illegible]			

Special Aids or Devices Used	Student Reaction
Circuit analyzer	The student was very interested in the perform[illegible]
Raised line drawing kit	

[illegible] ACTIVITIES	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED IN A [illegible]	RESULTS
Electronics [illegible] [illegible]	Demonstrations: 1. How to draw symbols 2. [illegible] 3. Fix resistor 4. [illegible] 5. [illegible] [illegible] 1. [illegible] 2. [illegible]	No problems encountered	The student learned how to draw symbols. The student learned the difference between [illegible] and [illegible]. The student [illegible]
	[illegible] Printed Circuit Design Kit Circuit analyzer		[illegible] Student seems to be very interested.

73-7

[illegible]

LEARNING ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Radio Assemble a crystal set Soldering joints [illegible]	The student will assemble his crystal by following a schematic drawing.	The student had a problem finding the terminals on the loop stick and tuner. [illegible]	The student was able to solder four joints on the set. He also was able to read the schematic.
	Special Aids or Devices Used Raised line drawing kit		Student Reaction Student seems to become disturbed when he has a problem to solve that requires time.

152

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Completion of crystal set	Used raised line schematic for location of connections on radio set.	None - student needs to develop patience in tuning for best results.	Radio received about [illegible] stations successfully.
Tuning crystal set	[illegible]		Operation of radio [illegible] speaker.
Connected crystal set to one stage amplifier			
	Special Aids or Devices Used		Student [illegible]
	None		Student was very proud of his project.

157

E3-9

EXPERIMENTAL INSTRUCTIONAL EVALUATION

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Lesson discussion of material assigned covering basic radio, signals and kinds of transmission	Material given to student on tape. Teacher-student question and answer period held.	Time to prepare tape took away from class time.	Satisfactory.
Worked on one tube radio	Teacher explained step by step.		Satisfactory.
	Special Aids or Devices Used		Student Reaction
	Tape recording made of material.		Indifferent.

158'

[illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Study of electric motor	Use of model of a motor a. Named parts b. Trace circuits c. Magnetism d. Field coils e. Function of commutator	None	Satisfactory.
Series and parallel circuits	Discussion with question and answer period with examination of motor.	Some difficulty to transfer the idea from battery circuit to motor. Have available simple material to show circuit.	Satisfactory.

Special Aids or Devices Used

Simple motor model

Student Reaction

Student's interest hard to arouse until motor operated.

159

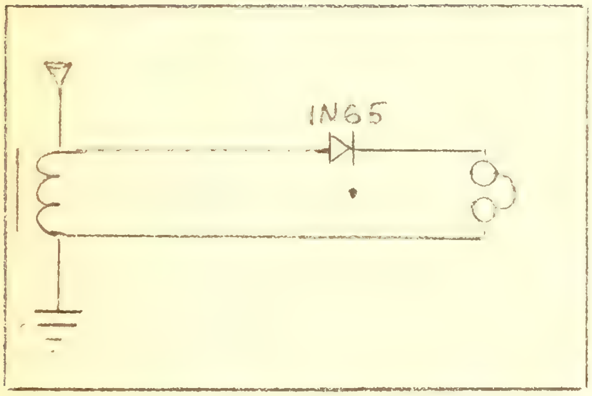
E3-11

[illegible]

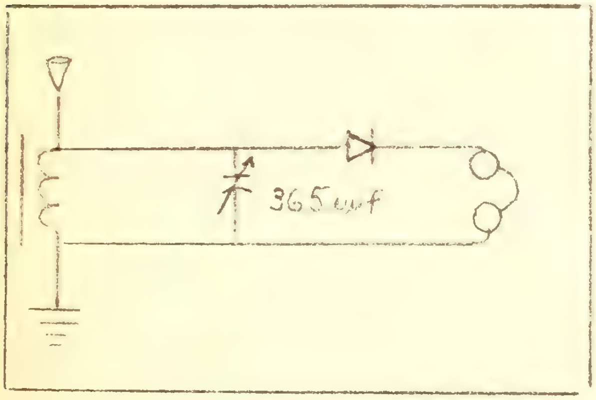
LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Production of electricity	Magnets powered board complete with lights, bells, motor, and switches for AC and a double throw, double pole switch for changing to DC. Electricity produced by a. static b. chemical c. magnetic d. heat e. light f. crystal Method: Experimentation and demonstration	This is a means of showing that it takes energy to produce electricity. By turning magnets without making a connection it turns easily. When light is connected it turns with difficulty. A teaching aid with a microammeter hooked in series with devices for producing electricity by heat, light, magnetically. Auditory circuit analyzer was hooked in circuit so student could hear electricity being produced by various means.	Student saw relationship of AC and DC current. Satisfactory.
	Special Aids or Devices Used: Circuit analyzer		[illegible] Alert and interested.

160

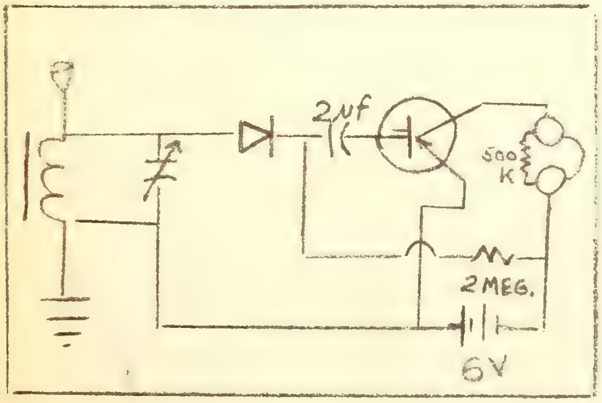
SIMPLE CRYSTAL RADIOS



#1. Simple crystal set tuned with adjustable Ferri Loopstick.



#2. Simple crystal set with variable capacitor, tuned by adjusting the capacitor for greater selectivity.



#3. Simple crystal set with variable capacitor and transistor amplifier. Tuned by adjusting the capacitor and amplifing the signal with a transistor..

[illegible] INSTRUCTIONAL [illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
1. Setting up a series circuit. 2. Setting up a parallel circuit. 3. Operating two lamps with one double switch. 4. Operating one lamp with two double switches. 5. Placing thermostat, switch and lamp in the same circuit, and observing the [illegible] of the [illegible].	1. Teacher and student lay out a series circuit. 2. Student disassemble the circuit and set it up alone and operate it. 3. Teacher and student lay out a parallel circuit. 4. Student disassembly circuit and lay it out alone. 5. Turn switch on and check devices. 6. Using the same circuit connect two batteries in parallel and note the change in the brightness of the lamps. 7. [illegible] the cause of the change. 8. Disassembly the layout. 9. Place thermostat in a series circuit and discuss the nature of the effect on the circuit.	The student moved smoothly through all the operations, however he did have difficulty in knowing when the lamp was on was not burning. This problem was solved by placing two batteries in series so as to produce enough current so that the lamp would get warm enough to be accurately detected by the fingers alone. Those having light perception will have very little difficulty with the light problem.	The student was very receptive and was able to carry on very much on his own once shown [illegible] carefully how the circuits [illegible] look when layed out.

Special Aids or Devices Used

Kit 3E

The circuit kit

Student Reaction

[illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	DIFFICULTIES ENCOUNTERED & MODIFICATIONS	RESULTS
Checking voltage and resistance using circuit analyser Check various materials and voltages	Review of previous lesson - circuits Introduction of circuit analyser, explaining switches and dials Check various resistances - - [illegible] - resistor - [illegible] - [illegible] Test voltage (DC)	Need for braille numbers on dial of analyser (too slow to correct present settings) Too many terms introduced in one lesson Recall for review purposes dropped considerably because of too many terms	Student was able to accurately check voltage and resistance
	Special Aids or Devices Used Braille calibrated circuit analyser Kit SE-2 (circuits)		Student Reaction Student very interested in circuit analyser Works hard because he feels progress he is making

163

LESSON ACTIVITY	METHOD OF INSTRUCTION	STUDENT DIFFICULTIES & SUGGESTED CHANGES	REMARKS
1. Review location and function of each knob on circuit analyzer	1. Reviewed circuit analyzer to see if student remembered parts and their function.	The student did not remember the various parts and function of the circuit analyzer, therefore, it was necessary to review. This could be overcome by allowing student additional work with analyzer.	Student carried out directions quite well after commencing activity.
2. [illegible]	2. Set up a series circuit.		
3. [illegible]	3. [illegible]		
	Special Aids [illegible] 1. Circuit Analyzer 2. Circuit kit		[illegible] Student has developed [illegible] interest in his work because he [illegible] this is an approach to other phases of [illegible].

XI-4

LESSON ACTIVITY	[illegible] OF INSTRUCTION	[illegible] + SUGGESTED CHANGES	RESULTS
Introduction to - voltage - current - resistance	1. <u>Review</u> Series and parallel circuits Circuit analyzer and the function of controls 2. <u>Introduce</u> volts = voltage amp = current ohms - resistance 3. <u>Problem</u> Test - resistance of wire Predict which wire would [illegible] [illegible] on analyzer	Problem - We went too fast; gave the boy too much material. He got terms confused. Kits are good but we need more time for material to be absorbed by the student.	Poor! because of confusion of previous material. He did get the idea of voltage current and resistance however.
	<u>Special Aids or Devices</u> Kit SE-2 Circuit analyzer Raised line drawing kit		<u>Student Reaction</u> He was somewhat dejected until allowed to do actual testing using the analyzer.

165

III-5 [illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
1. Orientation concerning solder and soldering gun. 2. Student making trial run and performing the actual soldering of two wires.	Demonstration and lecture: Demonstration: 1. Student shown how to make loop in wires to be soldered. 2. Acquaint student with making correct approach with soldering gun and solder. 3. Student shown how to set work up in alligator clips.	Student had minor difficulty in making loop in wires and making the correct approach with soldering gun.	Student's first attempt was successful.
	Special Aids or Devices Aligator clips to hold wires in position for soldering.		Student Reaction Student was very pleased.

166

[illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
1. Trace the circuit of a crystal set. 2. Amplification by use of a transistor	Review - soldering - let student do a few joints. Lesson 1. Set up crystal set and have it working. 2. Change connections to include the transistor. 3. Make comparison in the auditory signal. 4. Now trace the simple circuit of the crystal set.	The student had difficulties with the kit. 1. Screws came loose from the masonite base. 2. Parts are very close for instruction. 3. Bolts that he replaced the screws with confused the student. 4. Schematic line schematic concept was not easy because the student felt the drawing should be just like the actual set.	With all problems student still traced the circuits on the actual kit.
	Special Aids or Devices Used 1. Raised line drawing board. 2. SB-5 communication kit crystal and transistor		**Student Reaction** No particular reaction.

[illegible]

[illegible]	[illegible]	[illegible] SUGGESTED CHANGES	REMARKS
Wiring and soldering of a simple crystal set circuit [illegible]	Lecture and demonstration: Demonstration: 1. Student shown location of joints to be soldered. 2. Student shown how to approach work with soldering gun and solder.	Student had difficulty in placing soldering gun in correct soldering position, maintaining the position until work is hot enough to apply the solder. Suggestion: Do as much soldering as possible before mounting the elements of the set.	The student was able to [illegible] the work after several [illegible]
	[illegible] No adaptations necessary		Student [illegible] No reaction

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Make an electro-magnet.	Have student wind an insulated 16-D nail with bell wire. Hook up the coil to a flash-light battery to make a simple electro-magnet.	Commutator was small and therefore hard to understand its function. (need a blowup)	Student understands an electro-magnet and can make it.
Understand principles of magnetism	Explain current in wire creating magnetism around the wire. (Coil and show which) direction of current controls north and south poles of magnet.		He can explain the basic operation of a simple D.C. motor.
Basic motor construction	Set up magnet on [illegible] [illegible] [illegible]		
	[illegible]		
	[illegible] coil.		
	Special Aids or Devices Used		**Student Reaction**
	No special aids except have aids large.		He was surprised [illegible] he could understand the basics of electro-magnet and motor.

[illegible] INSTRUCTIONAL [illegible]

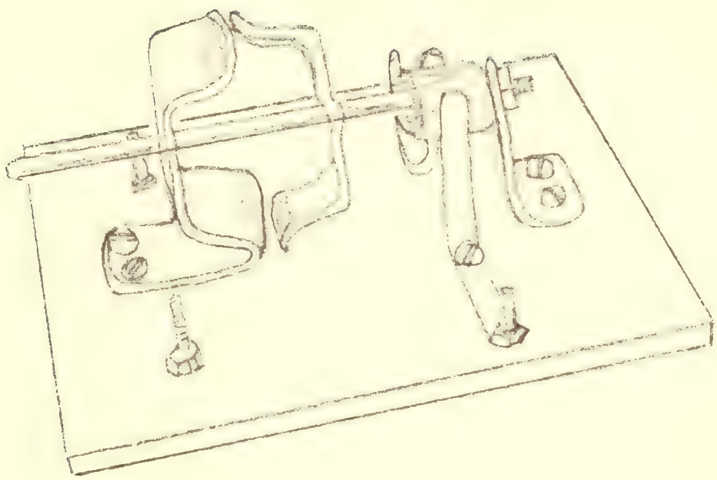
LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Learning the color code of resistors Interpret the colors and their values, and checking them out on the circuit analyzer.	Demonstration and lecture: 1. The student was told the basic values of the colors in the color code system. 2. Teacher and student [illegible] together the information imparted above. 3. Student gave value of resistors to teacher and checked them out on the analyzer. 4. Teacher and student set up parallel circuit, placing [illegible] resistors in the circuit. 5. Student [illegible] voltage and resistance of each [illegible] the analyzer. 6. [illegible]	Student did not encounter any difficulty.	Student worked with the color code system and applied it to the problem very well.
	Special Aids or Equipment Used Laboratory Circuit Analyzer		Student Reaction Student pleased with results.

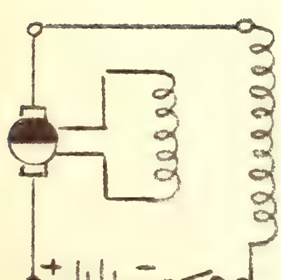
EJ-11

EXPERIMENTAL INSTRUCTIONAL EVALUATION

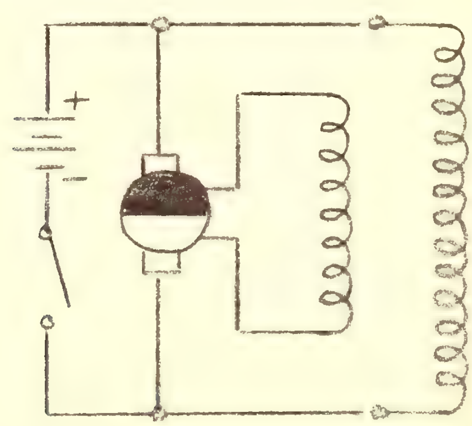
LESSON ACTIVITY	METHOD OF INSTRUCTION	TEACHING EXPERIENCE — SUGGESTED CHANGES	RESULTS
Constructing a crystal set	Demonstration: 1. All holes were pre-bored for student. 2. The student mounted brackets, using small nuts and bolts for headphone jacks. 3. The student, with teacher's help, wired crystal circuit. 4. Student was given [illegible] [illegible] and the "bugs" independently.	The student experienced a little difficulty in making proper connection of wires. Suggestion: Use small nuts and bolts when [illegible] clips are not available.	The student set crystal set for operation, but did not solder the connection, however, the set did work.
	Special Aids or Devices Used None		Student Reaction Student was pleased when he turned in stations.

ELECTRIC
MOTORS





SERIES



SHUNT

EXPERIMENTAL [illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
1st day Orientation	Demonstration and question	No problems encountered	Excellent. Student knows basic electricity well and needs to be challenged.
2nd day Introduction to construction small electric motor	Demonstration and the procedure of letting student get ideas of what parts were like.	No problems	
3rd day Student began assembly of motor kit. Identification and function of parts explained.	Demonstration and explanation with questions after each step.	Problem of repetition in winding field coils. It was felt necessary student realize importance of exactness of number of turns required. If rotor does not operate efficiently student will understand reason.	Results very satisfactory - student can move at rapid rate successfully. 1 hour spent winding field coils and assembling other small parts [illegible]
	Special Aids or Devices Used Kit Electric motor		[illegible]

[illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	[illegible] SUGGESTED CHANGES	RESULTS
1. Put rotor and commentator on shaft 2. Attach brushes 3. Hook up and test	Review all steps and parts of motor Explain the brushes and how they activate the motor	Student had difficulty visualizing commentator. Would suggest a larger model. A means of identifying the binding posts (positive) (negative) needs to be used by using round or square or filing a slot in one.	Negative. Current in field and rotor but no action with 3 - [illegible] cells.
Special Aids or Devices Used Field magnet was activated for student			Student Remarks "Knew it wouldn't work, nothing he makes ever does"

174

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Learned parts of motor and their functions	A 15 question quiz concerning parts of motor and their functions.	How to make braille symbols on raised line kit	Student has above average understanding of motor parts and their uses
Operating motor	Had motor running successfully for the first time.		
Learning schematic drawing of motor hook-up		Very important to have commentator segments in proper relationship to armature. Student may have considerable difficulty	
	Special Aids or Devices Used		Student Reaction
	Raised line drawing kit		Student was pleased with motor running. He suggested a schematic chart in braille.

175

[illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
1. Circuit analyzer	Demonstration and explanation. The instructor read the manual to the student and explained each dial, switch, etc. on the test device. Also, the different functions of the device were explained.	No problems.	1. Understood very well.
2. Test of resistors with circuit analyzer	The instructor tested a resistor, showing the student the procedure, step by step.	No problems	2. Good results - [illegible] his own, within the [illegible] tolerance, the [illegible] the resistors.
3. [illegible] a [illegible] metal [illegible]	The instructor selected a piece of sheet metal. The student did the lay out, cutting one [illegible] of the metal.	No problems	3. Good
	Special Aids or Devices Used		**[illegible]**
	Braille rule Circuit analyzer		Satisfactory.

[illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Construct 3-tube audio amplifier. Punched holes with Greenlee Punch into chassis.	Set up operation and helped student punch first one. Student punched others himself.	No problems	Good
Filed edges of punched holes and put in sockets.	Learned during previous I.A. explaining how sockets were assembled and student did the others.	No problems. Had trouble putting rings on sockets on underneath side of chassis. Should have chassis in vise or hold stable so work doesn't move on him.	Good
Locate position for switch and volume control and [illegible] punch and drill holes	Holes should be near as possible to the unit it [illegible]. Student figured the lug number and made the connection (by [illegible])	No problems	
Connect the various components.			

Special Aids or Teaching Aids

Greenlee Punch

Student Reaction

Student happy and content with what he accomplished.

177

[illegible]	[illegible]	[illegible]	RESULTS
[illegible]	Demonstration and explanation. The instructor guided the students work, by moving the [illegible]	Student had trouble manipulating both solder and gun. He had a tendency to push too hard on the gun. [illegible] with additional practice.	Satisfactory
[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]		Satisfactory

178

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Continue connecting the component parts and soldering them together	Loop resistor wires in and solder (loop fills with solder)	Student still has difficulty with soldering - he insists on taking the iron from the work too soon.	By end of 2nd session with the soldering he had it mastered.
	[illegible]		Student [illegible]
	[illegible]		Satisfied with his soldering progress.

[illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Complete 3 tube audio amplifier by soldering in output transformer and speaker	Review progress made yesterday. Output transformer is speaker transformer which reduces the amount of power going into the speaker.	Unit was checked without tubes - there was a short. Set was checked out again. Speaker was defective. Speaker was checked with multimeter. Speaker was replaced. Important to have all components checked and in good condition before allowing student to install them in his unit. Trouble shooting of faulty components can be very discouraging if encountered too early.	All tubes were checked out okay.
	Special Aids or Teaching Tools Multimeter Speaker		**Student Reaction** Interest was low due to troubles encountered.

62-13

[illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & NECESSARY CHANGES	RESULTS
Trouble shooting and checking of circuit on 3 tube amplifier	Review principle of the amplifier and the 3 tubes	A better antenna was necessary. A quiet room was essential	Satisfactory
	[illegible] None		[illegible] Student pleased when set worked.

181

TRANSPORTATION JOBS PERFORMED

1. ORIENTATION TO AUTOMOBILE (TACTUAL)
2. SPARK PLUGS - REMOVE, CLEAN, REGAP, AND REPLACE
3. SMALL ENGINE - TEAR DOWN AND ASSEMBLE
4. COMPRESSION CHECK
5. IGNITION SYSTEM - BENCH HOOK UP AND CHECK
6. SET TAPPETS
7. TIMING AUTO ENGINE - POINT OPENING METHOD
8. REVIEW OF PARTS OF BICYCLE
9. OVERHAUL NEW DEPARTURE BICYCLE BRAKES
10. TIGHTEN SPOKES TO ALIGN BICYCLE WHEEL
11. BLEED BRAKE LINE AND ADJUST SHOES
12. SERVICE BICYCLE FRONT WHEEL CONES AND BEARINGS
13. ADJUST MIXTURE CONTROLS ON OUTBOARD ENGINE

[illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Description and orientation of automobile engine [illegible] Battery [illegible] [illegible] block Carburetor [illegible]	Student orients himself to all parts of the engine, tracing and locating their position. The parts are explained and their [illegible]. Student learns the sound of the engine idling and racing. Remove air filter. Check oil in crankcase and [illegible]	Possibility of getting burned on engine. Danger from spinning fan blade and [illegible]. Danger of bumping head on raised hood. Safety is stressed.	Student has trouble checking oil mark on dip stick. Student did good job of [illegible] air filter and replacing it. Student is highly interested in all phases of [illegible].
	Special Aids or Devices Used None		Student Reaction Student asked many questions besides the following: "What runs the windshield wipers?" "What is the timing of this car?" "What do you do when you tune up a car?" "What is compression ratio?" "What is the spark plug gap on this car?"

EXPERIMENTAL INSTRUCTIONAL EVALUATION

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Spark plugs	1. Loosen plugs and remove from engine block 2. Check plugs 3. Clean plugs in sand blasting machine 4. Gap plugs 5. Replace plugs in engine block	1. Difficult in placing wrench on some of the plugs, due to their location. 2. Student can not see the spark when checking a plug. A buzzer might be placed in the machine to indicate when plug is sparking and when it stops sparking.	Student understands functio of spark plugs, maintenance of plugs, and purpose of gapping plugs.
	Special Aids or Devices Used None		**Student Reaction** "Motors fascinate me." "I really enjoy this." "I had no difficulty in cleaning and gapping the plugs."

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Small engine a. Compression b. Carburetion	Student worked on 4-cycle engine and took it apart as far as was practical. In this way the student became familiar with the parts and how they functioned. [illegible]	Too much theory seemed to confuse student to a degree. Smaller units might be of more value [illegible] Student had no comprehension of parts and their relationship to each other [illegible]	Student became familiar with the function of spark plugs, head, combustion chamber, [illegible], crank shaft, intake and exhaust valves and oil pan. Student was very interested in the small engine.
	[illegible] None		[illegible] No reaction. Student became frustrated with putting motor back together, but when it was finished he was happy.

TI-4

[illegible] ACTIVITY	[illegible] OF INSTRUCTION	[illegible] ENCOUNTERED & SUGGESTED CHANGES	RESULTS
1. Compression check	1. Explain the purpose of checking compression. [illegible] of compression.	1. Student cannot see the compression gauge. If the [illegible] is removed he [illegible] feel the gauge needle.	Student understands how breaker arm, points and cam function in regard to ignition.
2. Distributor	2. [illegible]	2. [illegible] small [illegible] in the distributor [illegible] feel and [illegible]	Student adjusted [illegible] and observed spring [illegible].
	[illegible] points. [illegible]		
	[illegible]		Student [illegible]
	[illegible] of breaker arm, cam and points		"[illegible] was hard to understand."
			"I understand how to check compression and what causes compression drop."

186

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Ignition system coil	Verbal explanation of the theory of the coil. Student made a complete circuit by hooking the battery, coil, distributor and spark plug together to complete the circuit.	It was rather difficult for the student to think through the electrical circuit of the ignition system. Learn the parts of the ignition system and their functions by hooking them together on a bench, then study them in their relationship to [illegible]	Student is able to complete the ignition system circuit.
	Special Aids or Devices Used None		**[illegible]** "The ignition system electrical circuit can be rather confusing."

LESSON ACTIVITY	EXTENT OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Automobile [illegible] tappets checking valve [illegible]	Student removed valve cover. Student adjusted each tappet with [illegible] wrench and feeler gauge.	No problems	With some practice the student acquired [illegible] degree of accuracy with the feeler gauge.
	[illegible] None		[illegible] Student really [illegible] enthused when performing operations on a running engine.

188

[illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	STUDENT'S DIFFICULTIES & SUGGESTED CHANGES	RESULTS
Adjusting tappets	Activity period for previous lesson. 1. Set tappets on a cold motor. 2. Instructor tested settings by using hot running motor method.	Tappets were set too loosely. Cold setting not accurate. Student could set them, in some cases, on a running engine. Student worked across the motor in an awkward position. Caution and instruct student in proper position. Student had problem keeping wrench in proper relationship to nut. Feeler gauge was not kept parallel to the tappet surface causing some poor readings.	Student can set tappets to a fair tolerance. (Possibly he could set it while [illegible].) No apparent dangers were involved except over confidence.
	Special Aids or Devices Used None		Student Dr[illegible] Student is over confident. He is not cautious about things like fan belt and other moving parts.

VI-7

[illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED —SUGGESTED CHANGES	RESULTS
Automobile Timing	Explained that when the pointer is in line with the specified degree reading that the piston is at top dead center. At this point the distributor must be rotated until the contact points open.	Student had to place his finger in the first cylinder hole in order to establish the position of the piston. Strobolite cannot be used with blind student.	Student now understands the procedure to follow in timing.
	Application of Learned Items None		Student Reaction "I had some difficulty with the beginning of the degree readings on the damper wheel."

190

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	REMARKS
Assembly [illegible] departure brakes for a bicycle	Activity: (Work directly with student) Actually a review of previous lesson.	Spatial relations of chain and sprocket caused problems for student. Student is still having problems with a wrench. He can't make it stay on the nut. Student tends to get in awkward positions. Student loses tools - this can be overcome by stressing habits in setting down tools. Proper grip of tools should be stressed. Parts that are not in close area of work (such as brakes, etc.) tend to be over-looked.	Student and teacher put [illegible] departure bicycle brakes together. Student has not as yet done it by himself.
	Special Aids or Devices Used None		[illegible] Student [illegible] to do the difficult [illegible] operation.

[illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Bicycle repair a. Review parts b. Cleaning c. Remove and replace rear wheel	Removal of back wheel. Removal of tire and tube. [illegible] the interior parts of rear sprocket. [illegible]	Had trouble replacing slot washers in rear sprocket. Had difficulty removing and replacing the chain. Be careful in handling and replacing slot washers when removing and replacing them.	Student did a very good job of taking the wheel off and apart and replacing it.
	Special Aids or Devices Used		Student Reaction
			"I know a little bit about bicycles. I helped my [illegible] fix his bicycle. The rear sprocket was the only complicated part."

EXPERIMENTAL INSTRUCTIONAL EVALUATION

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Bicycle repair: 1. Tighten spokes of bicycle	1. Find warp in wheel. Tighten and loosen spokes respectively until wheel is straight.	1. Difficult to determine which spokes should be tightened. Overcome by using a click-o-matic rule with extension using measurement from axle to rim, gauging minimum distance as starting point.	1. Student did get the warp out of the wheel
b. Bleed brake line and adjusted the brake shoe and drum.	2. Demonstration of the procedure, then the student performed the operation. Explain the parts of the brake system and how they functioned.		2. Student was familiar with parts of the brake and the principle of the brake system. He did very well with the brake adjusting.
	Special Aids or Devices Used None		Student Reaction: Tightening spokes was interesting but it got frustrating.

TRANSPORTATION

JOBS

PERFORMED

1. ASSEMBLED IGNITION CIRCUIT
2. REMOVED SPARK PLUG, CLEANED, REGAPPED, AND REPLACED
3. ADJUSTED BRAKES
4. BLEED BRAKES
5. LUBRICATE FRONT WHEEL BEARINGS
6. REPACKED FRONT WHEEL BEARINGS
7. TEAR DOWN AND ASSEMBLE FOUR CYCLE ENGINE
8. START AND ADJUST CARBURETOR SETTING - 4 CYCLE ENGINE
9. STARTED AND ADJUSTED OUTBOARD ENGINE
10. CLEANED AND TUNED LAWN MOWER - SHARPENED BLADE
11. START MODEL AIRCRAFT ENGINE - GLOW PLUG
12. START MODEL AIRCRAFT JET ENGINE

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	[illegible]
Orientation of automotive	Student finds different parts of engine and tries to explain function – radiator, fan, generator, fuel pump, [illegible] exhaust manifold, spark plug, distributor, battery	Engine was very warm and kept student from locating all parts. Changed to cold engine.	Very good
[illegible]	[illegible]: [illegible] 2 Coil 3 Distributor Student was given demonstration on circuit of ignition.		
[illegible]	Student completed circuit. [illegible] [illegible] [illegible]	Student was able to connect circuit. [illegible]	

Special Aids or Services Used

None

Student Reaction

Many questions were brought up as to different parts of car. Student surprised himself by what he knew about the operation of the car.

195

[illegible] OF INSTRUCTIONAL EVALUATION

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Internal combustion power	Demonstration and lecture 1. Lecture. Internal combustion power	Student had trouble understanding parts and how they moved together. Found cut away of actual machine helped greatly.	Student learns fast. Has a good understanding of science, and had little trouble with the combustion [illegible] sequence.
Operation of the [illegible] cycle engine	Demonstration, turned crank[illegible] [illegible]	Problem in naming parts. More instruction will help.	
	[illegible] Aids or Devices Used		Student Feeling
	Cut away parts of machinery		"Think I understand."

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Cleaning, setting and installing spark plugs Replacing and setting points	Procedure and its necessity was described in detail. [illegible] None	Engine was warm which made the student more cautious. Student had difficulty in placing the movable breaker point correctly. It was necessary to go over the two points of contact several times before he succeeded in getting it correctly placed.	Successful on both counts. Student [illegible] Was pleased with his accomplishment.

[illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Disassembly of one cylinder engine—4 cycle	Lecture and discussion on the basic parts of the motor. 1. Demonstration on how to disassemble motor. 2. How to use wrenches such as sockets, box and open end.	If a student knew what was wrong with a motor or he just wanted to clean it, it would be advisable for him to place, if possible, all of the parts from the engine on a bench in order as they were taken apart. This would aid him greatly in reassembly since all parts would be in the correct order. The [illegible] difficulty is re-placing parts of the engine in order.	For the student's first attempt in doing such work, it was successful.
	Special Aids or Devices Used None		**Student Reaction** "It's o.k."

TP-5 [illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Study and compare dry and liquid clutch	Explain the parts and understand their function in the dry and liquid clutch	Difficulty in understanding the transmission of power through liquid clutch.	Dry clutch - good Transmission - good Liquid clutch - fair. This could be partially due to the small area open for examination.
[illegible] transmission	In a "cut away" transmission students, by trial and error, [illegible] to get gears into four positions.	Some difficulty was encountered in getting gears in reverse position.	
	[illegible]		
	Special Aids [illegible] Cut-away model of dry and liquid clutch Cut-away model of transmission		Student Interest Family recently purchased a new Falcon. Student feels he can "talk shop" with his father.

[illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Description of frame, springs, and finished body through tactual perception	Student was shown the following: X frame Coil springs Leaf springs Shocks Torsion bars Air suspension	No problems were encountered in teaching all units in column 1.	Student was able to relate some of the terms learned to those which his father has spoken of in their car.
[illegible]	Demonstration with visual aid of brake from the pedal: 1. Master cylinder 2. Brake pedal 3. Lines 4. Wheel cylinder 5. [illegible]		
[illegible]	Student adjusted brakes on instructor's car.		
	Special Aids or Devices Used No special braille aids used Use was made of brake system mounted on a platform. Sections of the drum were removed to see what was inside.		**Student Remarks** "Now I can understand the parts of a car when someone is talking about them."

200

[illegible]

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULT
[illegible] Brake work	Demonstrations: 1. How to use a car jack.		
[illegible]	2. How to remove wheel and inspect shoe.	Student had some trouble in removing wheel. [illegible]	Satisfactory
[illegible]	3. [illegible]	[illegible]	[illegible]
[illegible]	4. How to [illegible] a chassis	[illegible] lubricating.	[illegible]
	[illegible]	[illegible]	[illegible]
	[illegible] — Teaching Aids		[illegible]
	Used standard teaching aids		Satisfactory

201

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
2 cycle gasoline engine Starting and operating outboard motor in tank	Study wooden model complete with valves, piston, crank-shaft connecting rod and plug.	Only problem was to make student understand the mixing of gas and oil for fuel and lubrication.	Satisfactory.
	Special Aids or Devices Used Wooden model		**Student Reaction** Showed greatest interest in the controls of outboard motor.

202

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Trouble shooting 2 & 4 cycle engine	Lecture and demonstration on the important points one can look for when trouble occurs with small engines.	Lecture could have been put on tape so the time taken in class could be used for engine activity.	
Maintenance on lawn mower	Student demonstrated: 1. Start mower engine 2. Clean all grass from bottom of mower 3. Wipe engine and base clean with shop rag	None	Student now had the experience with not only the engine but was able to see how it was used as a useful machine.
	Special Aids or Devices Used Braille writer		**Student Reaction** He now could help his [illegible] work with their mower and understand its function.

203

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Clean and repair lawn mower	1. Remove and sharpen blade. 2. Remove gas tank and housing 3. Remove and clean spark plug 4. Remove carburetor 5. Adjust low and high speed carburetor jets.	Removing blade was a problem because of rusted bolt. The only other problems encountered were those of becoming acquainted with the position of the parts.	All problems would be eliminated with practice on mowing machines.
	Special Aids or Devices Used None		Student Reaction "It's o.k." Very difficult to get a positive reaction from student.

[illegible] [illegible] INSTRUCTIONAL EVALUATION

LESSON ACTIVITY	METHOD OF INSTRUCTION	PROBLEMS ENCOUNTERED & SUGGESTED CHANGES	RESULTS
Brake bleeding	Demonstration 1. How to manually bleed brakes.	The student had no problems in either of the bleeding operations.	Excellent understanding of operation.
	2. How to bleed using the pressure method.	Student had very little difficulty in feeling and inspecting bearings for pits or wear.	Satisfactory
Wheel packing	3. How to lubricate front wheel bearings. Related Information: How often to repack.	Student had a little trouble with cotter pin but for his first experience he did very well.	Satisfactory.
	Special Tools or Devices Used None		Student Reaction "I'd rather [illegible] bearing [illegible], [illegible] and easier."

APPENDIX E

SAMPLE OF PROJECT ANALYSIS

Special Education Laboratory - Dr. Huss

Metal	Build a Letter Holder
Area of Instruction	Topic of Instruction

Unit 1: Problems of Learning Faced by Blind Students

- Difficult to get mental picture when using perforated metal
- Stop cutting with tin snips
- Using hot solder and soldering devices
- Applying paint with a brush

Unit 2: Problems of Presentation of Instruction to Blind Students

- Accurate measuring to length on Rod Cutter
- Measuring to length on squaring shears
- Location of point of heat concentration
- How flame on propane torch might be adjusted
- Drawing alone will not give proper idea of a project

Unit 3: Technical Subject Matter

- Soldering devices
- Solders
- Flux
- Tinning soldering coppers
- Cleanliness
- Sweat soldering
- Cutting sheet metal
- Forming sheet metal
- Paint

Unit 4: Construction of Jigs, Fixtures, and other Adapted Instrumentation

- Vise grip pliers used as clamps
- Make flat surface on rounded surface so stock will not roll when clamped

Unit 5: Development of Special Instructional Materials and Devices

- Propane torch adjusted by sound
- Sheet metal clamped between two boards for both support and guide
- Use of raised line kit for making a working drawing

Unit 6: Related Instruction

- Chemical change of fluxes
- Capillary action of heated solder
- Where sheet metal is used
- Why finish is applied to metal

References:

- Feirer, General Metals; Unit 31 Solder
- Feirer, General Metals; Unit 22 General Information
- Feirer, General Metals; Unit 24, 25 Cutting and Forming

Special Education Laboratory - Dr. Huss

Woodworking	Shadow Box
Area of Instruction	Topic of Instruction

Unit 1: Problems of Learning Faced by Blind Students

- Measure with ruler, transfer measurements, layout dimensions
- Saw to a line with band saw and/or power saw
- Plane a board with a jack plane and smooth plane
- Joint construction
- How to use wood fasteners - nails, screws, glue
- Woodfinishing: use wipe-on finish

Unit 2: Problems of Presentation of Instruction to Blind Students

- Use of hand tools: Follow a line with a saw, plane a sq. edge, etc.
- Use of power tools and their adaptations and jigs
- Related information - wood, tools, maintenance, design, etc.
- Procedure of putting finish on wood

Unit 3: Technical Subject Matter

- Layout - measuring - squaring
- Sawing - (hand and power)
- Planing with jack plane
- Sanding
- Joint Construction
- Wood fasteners
- Wood finishing

Unit 4: Construction of Jigs, Fixtures, and other adapted Instrumention

- Guide to saw to line
- Raised line ruler for layout and transferring measurements
- Clamps to hold joints when fastening joints
- Line guides adapted for jig and band saws

Unit 5: Development of Special Instructional Materials and Devices

- Raised line drawing of shadow box
- Model project - Shadow box
- Sample of various woods and finishes - Small panels
- Samples of joint construction

Unit 6: Related Instruction:

- Wood
- Tools
- Maintenance
- Wood finishing

References:

- Feirer, John L., General Woodworking

Special Education Laboratory - Dr. Huss

Electronics	Crystal Set
Area of Instruction	Topic of Instruction

Unit 1: Problems of Learning Faced by Blind Students

- Reading accurately raised line diagrams (give verbally)
- Soldering connections (do all soldering possible before mounting)
- Spacing parts on base (pre-drill all holes)
- Holding material in place (use any of the various type clamps)

Unit 2: Problems of Presentation of Instruction to Blind Students

- Making out braille work sheets and tape recording lessons
- Putting labels on diagram
- Assign student work station with necessary tools
- Showing student the finished product (one similar to his)

Unit 3: Technical Subject Matter

- Following the circuit
- Securing the base
- Winding the coil
- Mounting the coil
- Locating the brackets and mounting them
- Wiring the circuit
- Testing the set
- Soldering the connections
- Hooking into an amplifying outfit

Unit 4: Construction of Jigs, Fixtures, and other Adapted Instrumentation

- Soldering clamps
- Setting up circuit with jiffy clip set

Unit 5: Development of Special Instructional Materials and Devices

- Making a circuit diagram on the raised line drawing kit
- Using a finished product as model
- Making braille copies of lessons or tape recording them

Unit 6: Related Instruction

- Studying the circuit made with the raised line kit
- How to put a crystal set together
- Its relationship to radio
- Different types of solder
- Types of diodes and resistors

References:

- Marcus, A., Basic Electricity

Special Education Laboratory - Dr. Huss

Electronics	5-tube Radio Receiver
Area of Instruction	Topic of Instruction

Unit 1: Problems of Learning Faced by Blind Students

- Circuit analyzer was needed to check and identify resistors and condensers
- The Solder Alligator Clip arrangement is advantageous to the student when soldering
- The Heathkit is a good educational kit that should be used whenever possible

Unit 2: Problems of Presentation of Instruction to Blind Students

- Verbal instruction is necessary to explain the parts and their workings to the student
- The schematic should be put on raised-line paper so the student can understand the problem. (Teacher should help the student to read the schematic)
- Braille labels need to be put on the Circuit Analyzer and the schematic
- Work must be stationary, as the student, sighted or not, can get confused if radio is moved around and parts are misplaced
- Plug outlets, antenna leads, and all test equipment needed should be centrally located near the work

Unit 3: Technical Subject Matter

- Identification of parts
- Use of test equipment
- Soldering
- Assembly of parts on chassis
- Testing for results
- Testing and checking through circuit for proper connections, etc.
- Playing of radio

Unit 4: Construction of Jigs, Fixtures, and other Adapted Instrumentation

- Soldering aid is helpful
- Heathkit, when available, is excellent

Unit 5: Development of Special Instructional Materials and Devices

- Raised Line Drawing Kit should be used to explain individual parts of radio and for schematic of radio
- Braille labels should be used on Circuit Analyzer and on schematic

Unit 6: Related Instruction

- Student will get full explanation of radio, parts and function
- Student will do actual work on project with occasional help from teacher

References:

"Heathkit Instruction Booklet"
Marcus, Basic Radio
Marcus, Basic Electronics

Special Education Laboratory - Dr. Huss

Electronics	(Multi-Meter) Heath Kit
Area of Instruction	Topic of Instruction

Unit 1: Problems of Learning Faced by Blind Students

- Reading schematics
- Recognizing values of conductors, resistors, etc.
- Finger coordination to assemble parts
- Soldering within the set

Unit 2: Problems of Presentation of Instruction to Blind Students

- Finding suitable teaching aid to assist schematics
- Magnetism - showing student lines of force
- Electron theory
- Lack of material for experiments

Unit 3: Technical Subject Matter

- Types of circuits
- Schematics
- Resistance
- Battery (wet and dry)
- Magnetism
- Inductance and capactance
- Crystal set (principle)
- Radio range of frequences
- Soldering

Unit 4: Construction of Jigs, Fixtures, and other adapted Instrumentation

- Circuit analyzer to check values of components
- Capacitors, resistors, etc.

Unit 5: Development of Special Instructional Materials and Devices

- Raised line drawing kit (schematics of circuits and theory)
- Pre-wired circuits to show actual project or activity

Unit 6: Related Instruction

- Electronics in industry
- Ham radio
- High fidelity
- Braille technical press (Talking books and braille books)

References:

- Allied's, Radio Builders Handbook
- Marcus, Basic Electricity and Radio

Special Education Laboratory - Dr. Huss

Transportation	Two Cycle Engine
Area of Instruction	Topic of Instruction

Unit 1: Problems of Learning Faced by Blind Students

Understanding the following:
- Combustion
- Piston and crankshaft movement
- Carburation
- Power train
- Ignition

Unit 2: Problems of Presentation of Instruction to Blind Students

- Showing how the explosion takes place in the cylinder
- Showing movement of engine parts
- Showing the function of the ignition system and inside view of coil, battery, etc.

Unit 3: Technical Subject Matter

- Principles of combustion
- Carburetor and function
- Transmission of power, engine to wheels
- Ignition

Unit 4: Construction of Jigs, Fixtures, and other Adapted Instrumentation

A teaching aid constructed of plywood of a model of an engine cylinder showing movable parts on surface

1. Cylinder walls and crankcase
2. Piston
3. Valves
4. Crankshaft
5. Connecting rod
6. Spark plug

Unit 5: Development of Special Instructional Materials and Devices

- 2 cycle (Clinton A-400)
- Stock engine with section cut out of cylinder
- Wall to allow student to see inside engine

Unit 6: Related Instruction:

- Different uses for two cycle engines
- Maintenance
- Tune-up procedure

References:

- Allen, W. A. Know Your Car

APPENDIX F

EXAMPLES OF SUPPLEMENTAL
INSTRUCTIONAL MATERIALS

STATE UNIVERSITY OF NEW YORK
COLLEGE OF EDUCATION
OSWEGO

I. A. LAB. 50 — Transportation Laboratory

Fundamentals of Transportation — Instructor: Mr. W. A. Allen

BASIC AUTOMOBILE ENGINE AND IGNITION AREA

The following outline is a list of operations that each student is expected to perform or become acquainted with. The main purpose is to understand the operating principles and to become familiar with basic automotive repair which might be carried on as a part of the industrial arts course.

I. Automobile Engine Operating Principles

A. Cooling system

1. Drain and flush (optional) __________
2. Remove thermostat and test - replace (from your car) __________
3. Check fan belt and adjust tension __________
4. Test radiator pressure cap __________
5. Test anti-freeze solution (if in radiator) __________
6. Check all hoses and clamps __________

B. Lubrication System

1. Check oil condition and level __________
2. Check oil filter, replace if necessary __________
3. Check for engine oil leaks __________
4. Inspect oil pump (use cut-away model) __________

C. Fuel System

1. Check system for leaks, kinked tubing, and loose parts __________
2. Clean sediment bowl (fuel pump and filter bowl if installed) __________
3. Check fuel pump pressure and volume. Vacuum may be checked on the boaster pump. __________
4. Adjust carburetor idle mixture and idle speed (use vacuum gage and tachometer). __________
5. Properly service the carburetor air filter on your car. __________
6. Trouble shoot a faulty fuel system on shop engine. (have instructor set up the problem) __________

AUTOMOBILE ENGINE & IGNITION AREA

I. Automobile Engine Operating Principles (Continued)

D. Engine (* indicates optional experiences - see instructor)

1. Adjust valve clearances ____

*2. Reface a valve ____

*3. Reface a valve seat ____

4. Examine the shop engine and identify the parts shown on the drawing (Unit 3) in your textbook. ____

*5. Remove one piston assembly and inspect bearings, rod, wrist pin and rings; reassemble parts in engine ____

*6. Check connecting rod bearing clearance with plasti-gage ____

7. Tighten the cylinder head and manifold bolts and nuts with a torque wrench to the manufacturer's specifications ____

II. Automobile Ignition System

A. Ignition

1. Inspect condition of wiring ____

2. Clean and adjust points (replace if needed) ____

3. Check contact point pressure ____

4. Inspect rotor and distributor cap(replace if needed) ____

5. Lubricate distributor ____

6. Check automatic advance units (use distributor checking machine) ____

7. Clean and adjust spark plugs (replace if needed) ____

8. Check primary and secondary ignition wiring ____

9. Test coil ____

10. Test condenser ____

11. Check compression of each cylinder ____

12. Time engine ____

13. Test engine for miss while running by
    a. shorting out each plug ____
    b. cylinder balance method ____

14. Trouble shoot a faulty ignition system (Have instructor set up problem) ____

AUTOMOBILE ENGINE AND IGNITION AREA (Continued)

II. Automobile Ignition System (Continued)

A. Ignition (continued)

16. Check Unit 26 in textbook for major engine tune-up, also Unit 16 for ignition system tune-up. ____________

17. Check ignition system with scope. ____________

III. Additional area experience ____________

IV. Area Summary (suggestions for improvement, needed tools and equipment, other comments) ____________

V. References:
List two selected references that you would like in your personal library for use at a later date in teaching this area. Use Oswego's accepted complete bibliography entry style.

VI. Review questions:

1. What are the two methods of flushing a cooling system?
2. What are the two commonly used thermostat temperatures?
3. How often should engine oil be changed? Oil filter? Types of engine lubrication systems?
4. What is the average fuel pump pressure?
5. Explain how to correctly adjust idle mixture.
6. Draw a diagram of the automobile ignition system and label parts.
7. Explain a thorough tune-up procedure.
8. Explain operation of radiator or pressure cap.
9. List all of the specifications required to perform a major tune-up on your car.

STATE UNIVERSITY OF NEW YORK
COLLEGE OF EDUCATION
OSWEGO

I. A. Lab 50
Fundamentals of Transportation

Transportation Laboratory
Instructor: Mr. W. A. Allen

BASIC AUTOMOTIVE CHASSIS AND ELECTRICAL AREA

The automobile chassis area, for educational purposes in this laboratory includes chassis lubrication, wheel alignment, tire care, brake work, body service, and power-flow experience. It is an important area of automobile maintenance that all automobile drivers and future automotive teachers should understand.

The automotive electrical system plays a very important function in the proper and safe operation of the automobile. Because of this importance, a separate study of the storage battery, starter, generator, regulator, and headlight system is suggested as a part of our course. In the actual industrial arts teaching situation this material would become an integral part of the whole course but in a teacher training situation, it seems advisable to separate the material for a thorough study to gain teaching skills. The study of the ignition system has been left in the engine area as it readily blends in with the study of the engine and general tune-up procedures.

Part I. Automotive Chassis

A. Lubrication

1. Do a complete automotive chassis lubrication job using the manufacturer's diagram and recommendations or an oil company's equivalent. ________

2. Lubricate and adjust front wheels (Instructor must check ________

B. Tire and Tube Repair

1. Remove tire and inspect casing ________

2. Patch inner tube using hot patch ________

3. Mount tire and tube on wheel ________

4. Wheel balance (optional) ________

5. Tubeless tire repair (optional) ________

C. Brake Mechanism:

1. Check brakes for brake lining wear and drum scoring ________

2. Bleed lines and remove air. ________

3. Inspect brakes and adjust if necessary(instructor must check adjustment) ________

4. Inspect hand brake and adjust if necessary ________

D. Power Flow Acquaintance:

1. Inspect clutch mechanism ________

2. Inspect drive shaft ________

3. Inspect transmission ________

4. Inspect differential ________

Part II - Electrical

A. <u>Storage Battery</u>

1. Specific gravity readings of your battery

________	________	________	________	________	________
cell #1	cell #2	cell #3	cell #4	cell #5	cell #6

2. Do the specific gravity readings indicate a 1/2 charge or better? ________

3. Recharge your battery (if necessary) ________

4. Clean battery case and terminals ________

5. Add water to the correct level ________

8 6. Check battery cable connections at ground and solenoid ________

B. <u>Starter</u>

1. Inspect the following starter drive systems and understand the operation of each
   a. Bendix drive ________

   b. Overrunning clutch ________

2. Understand operation of starter solenoid ________

C. <u>Charging System</u>

1. Visual check
   a. Check fanbelt adjustment and condition (replace if necessary) ________

2. Generator - regulator system
   a. Check generator brushes and commutator condition ________

   b. If generator - regulator system is operating incorrectly, get instructor's approval for further work.

3. Headlight and lighting system
   a. Check all lights and directionals for operation ________
   b. Check headlight aiming and readjust if necessary ________

D. Perform a complete New York State vehicle inspection. Draw conclusions as to whether or not it will help decrease accidents.

E. Additional area experiences

F. Area summary (suggestions for improvement, needed tools, and equipment, other comments).

G. References:

List two selected references that you would like to have in your personal library for use at a later date in teaching this area. Use Oswego's accepted complete bibliography entry style.

H. Review questions:

1. Explain a good 1000 mile chassis lubrication job.
2. List, by miles, the periodic lubrication schedule to be followed on your car in addition to the 1000 mile lubrication.
3. How do you bleed a brake mechanically? With pressure ball?
4. Explain minor brake adjustment on two types of brakes.
5. Explain the action of a differential; of torque converters; of clutch.
6. Explain the purposes of motor oil and the reasons for periodic changing.
7. Explain storage battery care and checking.
8. Name the two types of starter drives inspected and explain the difference.
9. What does the cut-out relay control?
10. What is the purpose of the current regulator? the voltage regulator? What do they protect?

STATE UNIVERSITY OF NEW YORK
COLLEGE OF EDUCATION
OSWEGO

I. A. Lab. 50
Fundamentals of Transportation

Transportation Laboratory
Instructor: Mr. W. A. Allen

SMALL ENGINE AREA
(2 and 4 cycle engine single cylinder, go-karts, and scooters)

The following operations are to be performed by all students. They represent an overall coverage of the area which will help you acquire knowledge and skills in this area and enable you to be better qualified to set up and teach similar areas in a school industrial arts program.

I. Small Gasoline Engine Area:

A. Preliminary examination

1. Start, run, test and stop engine ____
2. Inspect for oil and gasoline leaks ____
3. Inspect for looseness of parts ____
4. Clean up engine ____

B. Maintenance (two cycle and four cycle gasoline engines)

1. Clean and adjust spark plugs ____
2. Inspect flywheel magneto
   a. Magnet strength ____
   b. Frayed or loose wires ____
   c. Magnet pole and flywheel clearance ____
   d. Conditions of points ____
   e. Condenser ____
   f. Coil ____
3. Clean and adjust points if necessary ____
4. Check fuel line connections ____
5. Clean fuel system
   a. Sediment bowl ____
   b. Carburator ____
   c. Check fuel supply ____

C. Tune-up Procedure

1. Start engine ____
2. Adjust carburator for proper fuel-air mixture at low and high speeds. ____
3. Check ignition system while running (spark should jump 1/8" to plug without affecting performance. ____

SMALL ENGINE AREA - 2

4. Check valve clearances (4 cycle) ______

5. Stop engine by shutting off fuel and running it out of the carburator ______

D. Scooter and Go-Kart Operations (Go-Kart)(Scooter)

1. Study operating principles ______ ______

2. Make pre-run inspection ______ ______

3. Start engine ______ ______

4. Take trial run to observe the characteristics of a motorized scooter and go-kart. ______ ______

5. Stop, park, and clean up machines ______ ______

E. Disassembly and inspection (use engine specified for this operation ______

F. Additional area experiences ______

G. Area Summary (suggestions for improvement, needed tools and equipment, other comments)

H. References
List two selected references that you would like to have in your personal library for use at a later date in teaching this area. Use Oswego's accepted complete bibliography entry style.

I. Review questions
1. What type small engines use a mixture of oil and gasoline?
2. Draw a schematic of a flywheel magneto ignition system.
3. Explain the air cooling system of the engine.
4. How does the valve system differ in the 4 cycle small engine from the automobile engine?
5. How does a governor work on the small engine?
6. Explain 2 cycle engine operation and tell how it differs from 4 cycle engine operation.
7. Explain how to adjust low speed and high speed carburator settings.
8. Explain the major go-kart rules and regulations.
9. Explain procedure for preparing small engine for winter storage.

STATE UNIVERSITY OF NEW YORK
COLLEGE OF EDUCATION
OSWEGO

I. A. Lab. 50
Fundamentals of Transportation

Transportation Laboratory
Instructor: Mr. W. A. Allen

OUTBOARD ENGINE AREA

This area may develop stronger in one locality than another. It does not depend on nearness of water but on the interest of the community in terms of outboard use. Performance of all of the following operations will enable you to better plan, set up, and teach a unit on outboard engine maintenance in the industrial arts shop.

A. Preliminary examination

1. Check operating instructions, loose parts, clean engine, fuel engine. ________
2. Mount, start, run and stop ________

B. Maintenance

1. Clean and adjust spark plug or plugs ________
2. Check points and adjust if necessary, check wiring ________
3. Lubrication
   a. Mix fuel if needed ________
   b. Lubricate propeller, gears, and other specified points ________
4. Become familiar with cooling system ________
5. Replace sheer pin ________

C. Final check

1. Mount, start, observe for proper running ________
2. Adjust low and high speed jets ________
3. Check cooling system for proper operation ________
4. Check ignition system while running (spark should jump 1/8" to plug or plugs without affecting performance) ________
5. Check operation at all speeds. ________
6. Remove from tank, mount on outside stand and wipe clean.

D. Disassembly and inspection (use engine specified for this operation) __________

E. Become acquainted with

1. Safety check list __________
2. Trouble-shooting techniques __________
3. Fitting of engine to boat __________
4. Winter storage and seasonal care __________

F. Additional area experiences

G. Area Summary (suggestions for improvement, needed tools and equipment, other comments)

H. References

List two selected references that you would like to have in your personal library for use at a later date in teaching this area. Use Oswego's accepted complete bibliography entry style.

I. Review Questions

1. What type small engines use a mixture of oil and gasoline?
2. Draw a schematic of a flywheel magneto ignition system.
3. What is the average recommended height of a transom for an outboard engine?
4. Explain the cooling system of the outboard engine.
5. How should the engine angle be adjusted to the boat?
6. What is the recommended keel angle at the stern?
7. Explain 2 cycle engine operation and tell how it differs from 4 cycle engine operation.
8. Explain how to adjust low speed and high speed carburator settings.
9. Explain the action of the carburetor reed valve.
10. Explain how to prepare an outboard engine for winter storage.
11. Explain outboard engine spring service.

STATE UNIVERSITY OF NEW YORK
COLLEGE OF EDUCATION
OSWEGO

I. A. Lab. 50
Fundamentals of Transportation

Transportation Laboratory
Instructor: W. A . Allen

BICYCLE AREA

The following list of operations in the bicycle area represents the minimum that the potential teacher should perform. The purpose is to develop an understanding of the bicycle and bicycle maintenance to the extent that the student as a teacher will be able to set up and teach this area in the industrial arts curriculum.

(Please note: You are not required to perform the starred (*) items below. They are included to show possible maintenance which you should be prepared to help with in the school area.)

1. Bicycle Maintenance and Repair:

A. Disassemble, clean, inspect, lubricate, assemble, and adjust each of the following:

1. Front Wheel hub and bearings. ________
2. Chain ________
3. Pedal crank and bearings ________
4. Pedals and bearings ________
5. Rear wheel and coaster brake ________
6. Stem assembly ________
7. Have instructor check bicycle ________

B. General Repair

1. Replace broken spokes ________
2. True up rim ________
*3. Replace handle grips ________
*4. Tire and tube repair ________
*5. Straighten front fork and/or frame ________
*6. Fender and stay repair ________
*7. Refinish bicycle ________
*8. Repair broken chain ________
*9. Respoke wheel ________
*10. Check accessories and repair if necessary ________

BICYCLE AREA - 2

C. Become acquainted with:

1. Proper selection of bicycle for rider ________
2. Bicycle safety ________
3. Foreign bike maintenance and multi-speed coaster hub ________
4. Operation of the New Departure Coaster Brake ________

D. Additional Area Experiences: ________

E. Area Summary (suggestions for improvement, needed tools and equipment, other comments) ________

F. References:

List two selected references that you would like to have in your personal library for use at a later date in teaching this area. Use Oswego's accepted complete bibliography entry style. ________

G. Review questions:

1. How is the pitch of a bicycle chain measured?
2. Explain how the New Departure Coaster brake works.
3. List the seasonal checks performed on a bicycle.
4. Explain the two methods of fastening the stem to the forks,
5. Is there a serial number on a bicycle? If so, where is it found?
6. Name the various types of bicycle lubricants and where each is used.
7. Which pedal has a left hand thread? Where are other left hand threads used on a bicycle?
8. List three tire sizes used on present day bicycles. Three popular wheel sizes? Proper air pressure?
9. What is meant by "truing a rim"?
10. How may spokes be replaced without removing the wheel or tire?

5. Fuel tanks ____________

6. 2 speed engines ____________

7. Automatic fuel shut-off ____________

8. Classification of engine (figure displacement) ____________

9. Safe operation procedures and safety checks ____________

10. Two systems of U-control ____________

F. Additional area experiences: ____________

G. Area Summary: (suggestions for improvement, needed tools and equipment, other comments) ____________

H. References:

List two selected references that you would like to have in your personal library for use at a later date in teaching this area. Use Oswego's accepted complete bibliography entry style ____________

I. Review questions:

1. Explain glo-plug engine operation. Diesel operation, jet operation,
2. How is a propellor selected for stunt? For speed? For sport?
3. List the types of U-control. Free-flight. Radio control.
4. Explain the difference between 2 and 4 cycle engines.
5. How are fuel tanks constructed? How installed in plane?
6. What materials are used to make glo-plug fuel?
7. Name all parts of U-control system from flight handle to elevator.
8. Explain the carburetor as used on model engines.

STATE UNIVERSITY OF NEW YORK
COLLEGE OF EDUCATION
OSWEGO

INDUSTRIAL ARTS TRANSPORTATION Instructor: Mr. W. A. Allen

PROJECT IDEAS - TESTING EQUIPMENT

A. Tachometer

Pow-R-Tach transistor tachometer
Alquist Engineering without light 12.95
Milford, Pa. with light 14.95

Complete in kit form ready to be assembled and soldered. Specify car, year, and number of cylinders when ordering.

"Tachometer: You Can Assemble One Yourself". Popular Science, January 1960, pages 140-142.

Detailed article on assembly, installation, calabration, and how the Almquist Pow-R-Tack works.

"How to Build a Rev Counter for your Car", Popular Science, December 1952, pages 175-177.

Information on construction of a simple tachmeter. Approximate cost $16.00.

"Electric tachometer", Science and Mechanics, December 1959, pages 173-176.
Transistor circuit costing approximately $25.00

B. Automobile Volt-Ampere Testers

Volt-Ammeter kit to replace automotive indicating lights. Cost $10.75.

Allied Radio, Chicago, 80, Illinois

"Homemade Meter Quickly Checks Car Battery", Popular Science, October 1952, pages 192 - 194.
Construction and use of battery testing voltmeter.

C. Cam Dwell Meter

"How to Make a Transistor Dwell Meter", Popular Science, May 1960, pages 197-191.

Information on how to build a dwell meter that can be used on any car. Approximate cost $10.00

D. Compression Gauge

"What a Compression Gauge Can Tell You", Popular Science, February 1953, pages 201-203.

Article on how to build and use a compression gauge.

E. Timing Light

"Neon Timing Light", Popular Science, August 1950, page 167.

How to build a neon timing light.

F. Miles-Per-Gallon Tester

"How to measure Gas Mileage", Popular Science, September 1952, pages 172=173.

How to construct and use a device to quickly measure gasoline mileage.

G. Gradient Acceleration Brake Meter

"How to Make and Use a G.A.B. Meter", Popular Science, August 1960, pages 155-158.

Unit measures drawbar pull, brake fficiency, slope of hill, and total drag.

APPENDIX G

SAMPLES OF INSTRUCTIONAL OUTLINES

Three Week Outline of Instruction

METAL WORK

1st week

July 26 — Orientation to machine lathe

1. Making face cut and center hole
2. Practice general operation

July 27 — Continuation of work on machine lathe

1. Review of previous days lesson
2. Turning between centers and in chuck
3. Making a taper cut

July 28 — The use of the machine lathe as a precision tool

1. Use of measuring devices
2. Use of gauges or the equivalent that are on the tool
3. Practice making precision cuts

July 29 — Orientation to the shaper

1. Facing one side of metal block
2. Practice general operation and stress safety factors

2nd week

August 1 — Orientation to milling machine

1. Cut a keyway
2. Practice general operation
3. Take flat cut

August 2 — Orientation to drill press

1. Practice general operation
2. Discussion and organization of possible project that would include use of above machine

August 3	Project - Student assuming burden of operations to check reception of orientations
August 4	Project
August 5	Project

<u>3rd week</u>

August 8	Orientation to sheet metal 1. Discussion of various types 2. Methods of marking and measuring
August 9	Cutting 1. Hand and machine methods 2. Use of bar folder 3. Use of box and pan break
August 10	Make small sheet metal box 1. Marking and cutting 2. Bending with bar folder or box and pan break
August 11	Continuation of project 1. Preparation for spot welding 2. Spot welding half the box 3. Soldering half the box
August 12	Finish project and review

Three Week Outline of Instruction

METAL WORK

1st week

I. Wrought Iron Project - Shelf Bracket

A. Layout work

1. Measuring

2. Drawing with raised line kit

B. How to use a hacksaw

1. Parts of saw

2. Information on blades, kind, size

C. How to bend wrought iron

1. Bending with a vise to right angle

2. Bending scroll with a bending jig

D. How to mark metal for drilling

1. Setting up project with C clamps for drilling

2. How to use the drill press

E. How to select rivets and related information on same

1. How to rivet

2. How to use a rivet set

F. How to finish wrought iron

2nd week

II. Sheet Metal Project - Aluminum Flower Box

A. Introduction to sheet metal

B. Layout of pattern

1. Size needed and design

2. Transfer of pattern to metal

C. Cutting sheet metal

1. How to use tin snips

2. How to use squaring shears

D. Bending sheet metal

1. How to bend by hand, using hand tools

2. How to bend using bar and pan brake

E. How to file sheet metal

F. Spot welding of sheet metal

1. Introduction to workings of spot welder

2. How to use spot welder

G. Finishing

1. How to use a buffing wheel

2. Painting perforated metal

<u>3rd week</u>

III. Machine Shop - Introduction to machine lathe

A. Orientation to lathe

1. Location and purpose of parts

2. Four point method of approach

B. Preparation of stock

1. Cut with hack saw

2. Mount in 3 jaw chuck

3. Mounting and centering cutting tool

4. Facing ends stock

C. Mount stock between centers

1. Center drilling

2. Use lathe dog

D. Rough turning

1. Check diameter with calipers

E. Turning taper - using compound

F. Finish turning

1. Reading micrometer

2. Checking for finish dimensions

Three Week Outline of Instruction

WOODWORK

1st week

July 26 — Reading Measuring Instruments

1. Measuring with rule, square and click-o-matic
2. Sawing square end on board and checking with square

July 27 — Planning and laying out (corner shelf)

1. Reading and understanding simple drawing
2. Making a simple sketch
3. Marking with a scribe

Using the table saw

1. Learning the parts
2. Changing and adjusting blade
3. Cutting project material

July 28 — Using band saw

1. Learning the parts
2. Ripping and cross cutting
3. Cutting curves - using special guide
4. Cutting out project material

July 29 — Use of jig saw

1. Learning parts
2. Adjusting blade and special guide
3. Cutting irregular curves

<u>2nd week</u>

August 1 — Shaping irregular curves

1. Use of wood rasp and plane
2. Use of belt sander

August 2 — Use of jointer

1. Orientation and learning parts
2. Adjusting guard and fence
3. Jointing an edge

August 3 — Making rabbet joint

1. Layout using square and scriber
2. Cutting rabbet with hand saw

August 4 — Assembling

1. Trial assembling project
2. Gluing and nailing

August 5 — Wood finishing

1. Sanding surfaces
2. Applying rub-on finish

Introduction to wood lathe

1. Orientation and learn parts
2. Adjusting tool rest
3. Names to tools

<u>3rd week</u>

August 8 — Preparing stock for wood lathe

1. Removing corners with plane
2. Finding centers
3. Mounting stock in lathe

Rough turning

1. Use of turning gauge

August 9	Rough turning 1. Turning cylinder to size 2. Use of rule and calipers
August 10	Shoulder cuts and cone cuts 1. Laying out cuts 2. Use of skew and parting tool 3. Practice turning
August 11	Finish turning and sanding

Three Week Outline of Instruction

TRANSPORTATION

1st week

Tuesday — Exploring the automobile

1. Student will locate all parts that he can find under the hood
2. All parts will be given basic explanation

Wednesday — Introduction to general principles of 2 cycles and 4 cycles

1. Power and exhaust strokes
2. Carburation
3. Ignition

Thursday — Introduction to ignition

1. Coil
2. Distributor
3. Points
4. Plugs

Friday — Maintenance

1. Remove plugs, clean, re-gap, replace
2. Remove points

2nd week

Monday — Transmission and power tran.

1. Clutch
2. Automatic drive
3. Transmission
4. Drive shaft
5. Differential

Tuesday — Chassis

1. Frame, springs (leaf and coil)
2. Body (above the frame)

Wednesday 2 cycle

1. Principle of stroke
2. Intake and exhaust parts
3. Carburetor, fuel lines, etc.

Thursday Outboard, 2 cycles

1. Principles
2. Drive shaft
3. Propeller

Friday Lawn Mowers

1. Types
2. Sizes
3. Power plant

3rd week

Monday Airplane (model)

1. Glow plug
2. Ignition system
3. Principle of flight

Tuesday Jet airplane

1. Principles
2. Uses

Wednesday Bicycle

1. General repair
2. Maintenance

Thursday Bicycle (cont.)

General Metal Work
Unit: Sheet Metal
Operation: Grooved Seam

INTRODUCTION:

The purpose of this demonstration is to show the method by which sheet metal is joined together to make a seam. This is one of the basic processes in sheet metal work. The process will introduce the student to the Bar Folder and the Forming Machine as well as various basic hand tools. The student will be shown how to make a cylinder which may be finished into a can or pipe.

TOOLS AND MATERIALS:

Scrap for student practice
Bar Folder
Heavy paper for practice folds
Forming machine
Hand groover
Teaching aid showing examples of each process or step and how it fits in the final product

PROCEDURE:

General: Demonstrate with scrap metal and when point is clear make step in the demonstration project.

A. Bar Folder

1. Demonstration of functions and adjustments.
2. Use of stiff paper to check direction and size of fold. Be sure to point out that in order to make a lock seam the folds must go in opposite directions.
3. Stress point that stock must be pushed and held tightly against Bar Folder teeth to keep the fold square.
4. Fold both ends of stock in opposite directions.

B. Forming Rolls

1. Demonstration of functions and adjustments.
2. How to start sheet when there is a fold on both edges.
3. How to adjust back roll to get required size of cylinder.
4. Form cylinder stressing that care should be taken not to crimp folds.

C. Making a grooved seam

1. Hook folded edges.
2. Close seam by striking with mallet.
3. Select hand groover and demonstrate on scrap why you use one that is 1/16 th's wider than the seam. Show grooved seams made with wrong groover.
4. Start at one end and close seam.

D. Related Points

1. Measurement - The allowing of extra material equal to three times the seam width in order to achieve cylinder with desired circumference.
2. Notching - To facilitate making a burr at the end if desired.
3. Soldering seam to make it water tight.

REVIEW:

Have each student make a grooved seam to check their understanding of the lesson.

REFERENCES:

Feirer, John L., General Metals, Second Edition, McGraw-Hill Book Co., 1959, pp 146-156.

Transportation
Unit: Small Motors
Operation: Inspecting Parts of a Motor

INTRODUCTION:

A small single-cylinder 4-cycle engine can do a great deal to teach a student about engines and their parts by actual tactual experience. The engine can be opened up to allow the blind student to feel most parts in action and have it back together in $1\frac{1}{2}$ hours.

TOOLS AND MATERIALS:

Torque wrench	Cresent wrench
Ratchet wrench	Open-end wrench set
Set of sockets	4-cycle motor
Screw driver	

PROCEDURE:

I. Prerequisite - Student should have verbal knowledge of parts such as cam shaft, crank shaft, head, cylinder, etc. A review of this is desirable just the day prior to tearing down the engine.

II. Introduction - Explain the plan for the day (to tear down engine and see parts in action, thereby fortifying the verbal knowledge that students had of 4-cycle motors.)

III. Step-by-step procedure -

A. Tear down motor

1. Remove spark plug
2. Remove head
3. Remove carburator
4. Remove valve plate
5. Remove crank case pan

B. Inspect parts and their action

1. First, note the piston going up and down
2. Check the valves in relation to the movement of the piston. Determine the 4 cycles by the pattern in which the valves open.
3. Inspect the crank shaft and its relation to the connecting rod and piston and the cam shaft.
4. Note the size of gear on the crank shaft as compared to cam shaft and explain why one had twice as many cogs.
5. Find the cam lobes and consider the valve action.
6. Review the tie all parts together in one 4-cycle revolution.
7. Let students explain action to the teacher and the class as he revolves the crank shaft and feels the relating parts move.

C. Replace parts on motor. (Just reverse the order of tearing down. Note--do not tighten any bolt too tightly. It is only necessary to have snug fits.)

SUMMARY:

Many times blind students have a vocabulary of a subject without really understanding their vocabulary. They might say crank shaft, but never know what the proper relation a crank shaft has to other parts. I feel that the actual tearing down of a motor, therefore, could even be profitable to girls, even in a science course or physics, but best of all in industrial arts where we have the facilities.

Time needs to be taken to make sure every students gets to hold the parts as the drive line revolves. This fact limits the number of students that can be taught to no more than four. Too many hands in the motor cause confusion. Preferably, each student should at some time take the motor apart on his own.

Special emphasis should be given to proper working conditions. Have the motor so it can be mounted solid, at table or bench height. This helps the student by letting him use both hands to detect interaction of parts instead of fighting to hold the motor still. Also, have a bench area or tool rack for his tools. Tools on the floor get kicked around too easily.

REFERENCES:

Basic--"Briggs and Stratton 4 Cycle Air-Cooled Engine Repair Instruction," Briggs and Stratton Corp., Milwaukee 1, Wisconsin, U.S.A.

Advanced--Know Your Car, Willard A. Allen, American Technical Society, Chicago, U.S.A., 1960.

General Metal Work
Unit: Wrought Iron
Operation: Sawing with a hand hack saw

INTRODUCTION:

It is important that we learn how to cut metal, and the hack saw is one tool that does this job. Many other metal cutting tools are available.

Question to student: "What other tools cut metal?"

In this demonstration we will learn just what a hack saw is and the correct way to use it.

TOOLS AND MATERIALS:

Hack saw adjustable frame type
Hack saw blades, several sizes and kinds
Stock to be cut
Small triangular file
Vise
Chart showing samples of various types of cuts

PROCEDURE:

A. Name the parts of a hack saw

1. Blade
    a. Thickness
    b. Width
    c. Lengths

2. Hardness of blade
    a. All hard
    b. Semi flex
    c. Flexible

3. Blade set
    a. Alternate
    b. Raker
    c. Wave

4. Blade teeth
    a. For solid stock
    b. For thin or tubing

5. Adjustable frame--8", 10", and 12"

6. Handle, piston grip

7. Wing nut

8. Post for holding blades set for four different directions.

B. Select correct blade and mount it in saw with the teeth facing away from the handle.

C. Tighten blade in saw and after a few cuts tighten again.

D. Place metal in vise with cut off mark as close to vise jaws as possible.

E. Use a small file to mark a starting kerf for saw blade. Make sure more than three teeth are in contact with metal.

F. Grip the handle either in the right or left hand depending on what hand you use most. Start cut in small kerf with light strokes, grip frame with hand you are not using and apply pressure on forward stroke.

G. Move blade completely across work. Try to maintain a speed of 30 to 50 strokes a minute, keeping a uniform motion.

H. When the cut is about completed hold the piece of metal that is to be cut off and make the last few cuts with one hand.

REVIEW:

A. What type of blade is best for general sawing?

B. Name a metal from which saw blades are made.

C. How many teeth per inch are needed on a hack saw blade to cut soft steel?

D. What is the set on the blade?

E. In what direction should the teeth of a hack saw blade face--towards or away from handle?

F. Why is it good practice to have three or more teeth come in contact with the work?

G. Why is the work held at the end of a cut?

H. What is the recommended speed per minute for cutting?

I. How is thin wood used when cutting thin metal?

REFERENCE:

Feirer, John L., General Metals, p. 61-64.

General Metal
Unit: Sheet Metal
Operation: Sweat Soldering

INTRODUCTION:

Soldering is a method of joining two metal parts together with a third metal that has a lower melting temperature. Similar or dissimilar parts may be joined providing the following conditions are met: (a) Metals are physically clean, (b) Metals are chemically clean, (c) Proper solder and soldering devices are used, and (d) Proper amount of heat is applied.

TOOLS AND MATERIALS:

Perforated sheet metal	Acid core solder
Brass Ornament	Rosin core solder
Soldering furnace	Soldering copper
Flint lighter	Electric soldering coppers
Flux	Propane torch
Bar solder	Abrasive cloth

PROCEDURE:

Method Number one (soldering iron)

1. Select materials and clean areas physically, chemically.
2. With flint lighter, light furnace--adjust flame by sound.
3. Select, clean, and tin soldering copper.
4. Apply soldering paste to cleaned areas and tin using hot soldering copper and bar solder.
5. Clamp parts in place with vise-grip pliers.
6. Apply heat with soldering copper to sweat two surfaces together.

Method Number two (propane torch)

7. Repeat step #1.
8. With flint lighter, light propane torch--adjust flame by sound.
9. Using acid core solder tin two cleaned surfaces. Direct heat in predetermined path. (Clamps may aid in doing this)
10. Repeat step #5.
11. Apply heat with torch to join two tinned surfaces.
12. Clean and polish metal for finishing.

SUMMARY:

1. What are the four things needed to make a good solder joint?
2. What other devices could be used if there were no soldering coppers at hand?
3. List the steps for cleaning and tinning a soldering copper.
4. Why did we choose acid core solder for this job?
5. Name some other places that this type of soldering might be used.

REFERENCES:

Feirer, General Metals, pp. 166-172.

General Transportation
Unit: Automobile
Operation: Coil Spring Clutch

INTRODUCTION:

We have seen in previous discussion that the pistons move vertically or in an up-down motion. The following discussion will show how the power or energy of the engine is converted into a circular motion to turn the wheels of the car.

TOOLS AND MATERIALS:

Engine mounted on a stand for student inspection
Clutch assembly (not attached to engine)
Transmission (with part of the top section removed to inspect)

PROCEDURE:

1. Rotate the engine to show movement of flywheel.

2. Describe the parts of the friction (dry) clutch.

    a. Friction disc
    b. Clutch facing
    c. Pressure plate and facing
    d. Throwout bearing
    e. Clutch fork

3. Explain when the clutch pedal is out the pressure plate is forced against the flywheel and clutch plate, which in turn drives the power shaft. With the clutch in, the pressure plate is backed off the clutch facing and the engine is not connected to the transmission, therefore no power would be transmitted to the wheels. Allow student to feel.

REVIEW:

1. Where is the clutch assembly located?
2. Why is it called a <u>dry</u> clutch?
3. Why is the clutch enclosed in a housing?
4. When the car is running properly will the clutch slip and get hot? If not, why?
5. Is the clutch disc free floating?
6. What would happen if you were to <u>ride</u> the clutch when driving the car?

REFERENCES:

Willard Allen, <u>Know Your Car</u>, pp. 127-129.

General Metal Work
Unit: Milling Machine
Operation: Cutting a slot

INTRODUCTION:

The purpose of this lesson is to give the student a basic understanding of the milling machine, its parts, and how it works.

TOOLS AND MATERIALS:

Tools and aids needed for this operation include:

1. A working drawing on the raised line drawing kit.
2. Braille depth gauge.
3. Braille micrometer.

PROCEDURE:

1. Making approach and primary contact to power machine.
2. Observing the state of rest of motion of the machine.
3. Showing how to move around the machine safely.
4. Observing the progress of the work by senses.
5. Placing stock in vise.
6. Locating parts of machine and their functions.
7. Lining up cutter and stock for cut.
8. Adjusting machine for cut.
9. Making cut.
10. Checking depth of cut with various measuring instruments.

REVIEW-SUMMARY:

1. How do you approach the milling machine, and how do you find the primary contact, and how do you determine the state of rest or motion?

2. Where are the three major controls to move the work, and how do these controls affect the material with relation to the cutter?

REFERENCES:

Feirer, General Metals, pp. 305-311.

General Metal Work
Unit: Machine Shop
Operation: Chucking, Facing, Center drilling

INTRODUCTION:

The metal lathe is the only tool that we have in industry which can reproduce itself. Without the metal lathe it would be impossible to produce, cheaply, the various fittings and parts of machinery and tools to accurate specifications. With a high degree of skill and knowhow it is possible to make anything on the metal lathe.

The purpose of this demonstration is to explain how a piece of steel is placed in a universal chuck; how the proper tool is selected for the job and placed in the tool holder; the procedure of squaring an end of stock; and how to center drill the square end of stock so that it can be placed between live and dead centers.

TOOLS AND MATERIALS:

Metal lathe	One inch round stock
Facing tool	Drill press chuck
Universal chuck	Center bit

PROCEDURE:

1. Explain the difference between three jaw and four jaw chuck, telling when and how each should be used.
2. Secure stock in chuck.
3. Secure facing tool in tool post.
4. Find proper height of cutting tool by aligning the point of the tool with the point of the dead center.
5. Face end of stock moving from the center to the outside of the stock.
6. Remove dead center and secure drill press chuck with centering drill bit.
7. Center drill to proper depth.

SUMMARY:

1. What advantage does a three jaw chuck have over a four jar chuck?
2. What tool bit is used when squaring the end of round stock?
3. What method can be used in setting the cutting tool on dead center?
4. How deep should the dead center hole be drilled?

REFERENCES:

South Bend, How to Run a Lathe

Unit: Woodworking
Operation: Cutting an arc on the band saw

INTRODUCTION:

The cutting and squaring operation is finished. The plan indicates that an arc is to be cut across the front of the material. The student does not know how to scribe an arc or operate the band saw.

Objectives:

1. To teach the student how to scribe an arc.
2. To familiarize the student with the four-step pattern of safety.
3. To teach the student the major parts of the band saw.
4. To teach the student how to follow a scribed line on the material using the special band saw guide.
5. To teach the student how to cut the arc in the material.

Safety:

1. To show the student how to safely start and complete the cut (have student remove left hand from work when completing the cut).

TOOLS AND MATERIALS:

Raised line drawing kit
Dividers
Scrape piece with arc cut on it
Special band saw guide

PROCEDURE:

1. Lay out arc on material and cut notch at the starting point.
2. Acquaint student with the four-step pattern of safety.
3. Familiarize student with parts of the band saw.
4. Show student how to follow scribed line on saw using the special guide.
5. Perform the practice cut.
6. Perform the cutting operation on project material.

REVIEW:

1. What should be the position of the hands when approaching the band saw?
2. Name the parts of the band saw.
3. How can you best tell the correct point at which to start the cut?
4. What should be done to insure safety when completing the cut?

REFERENCES:

Feirer, John L., Industrial Arts Woodworking, Print pp. 202-205, Braille Vol. 3, pp. 393-396.

General Woodwork
Unit: Band Saw
Operation: Cutting Curves

INTRODUCTION:

The next step in construction of well-shelf is to cut out curved corner shelves. How could we do this? In our shop we have a band saw which is used for jobs such as this.

TOOLS AND MATERIALS:

Raised line rule
Scratch awl
Dividers
Special band saw guide
Pine $\frac{1}{2}$" x 10" x 10"

PROCEDURE:

1. Guiding student's hands orient him to parts of band saw switch, table, blade, upper and lower wheels, guides, motor
2. Review four step approach and acquaint student with path travel from switch to work.
3. Scribe curved line on board.
4. Place scribed line on point of guide.
5. Check position of guards and guides.
6. Hold work securely and start machine.
7. Apply forward pressure keeping index finger on point of guide and over scribed line.
8. Complete cut.
9. Turn off machine.
10. Use piece scrap stock to determine state of rest.

REVIEW:

1. Outline the proper method of approach to the band saw.
2. Name the parts of the band saw.
3. What are the safety rules for operating the saw?

REFERENCES:

Feirer, John L., Industrial Arts Woodworking, pp. 202-205.

Transportation
Unit: Automobile
Operation: Examining brakes and hydraulic cylinders for wear

INTRODUCTION:

With good brakes and a dry road it takes almost the length of a football field to stop a car moving 70 mph.

TOOLS AND MATERIALS:

Jack
Screw driver
Pliers
Crescent wrench
Cotter pin

Teaching aids - cut away model of brake assembly and hydraulic cylinder

PROCEDURE:

1. Remove wheel cover, hub-cap, cotter pin, nut, washer wheel and bearing.
2. With air hose remove all dust.
3. Examine brake shoes for thickness - this should be uniform. Shoes should be replaced if less than 1/8" thick in an area.
4. With screw driver turn up the hook on the ends of hydraulic cylinder - if brake fluid runs out get a hose and repair kit, otherwise it is ok.
5. Replace pieces removed from area in reverse order. Important thing is to tighten up nut as tight as you can then <u>back off 1/8 turn</u> so wheel moves freely.
6. Back wheels have to be removed with a wheel puller.

REVIEW AND SUMMARY:

1. Why should the brakes be replaced when 1/8" wear still remains?
2. Why is it important not to get a grease or brake fluid on the brake shoes?

REFERENCES:

Allen, Know Your Car, pp. 120-125.

APPENDIX H

SUPPLEMENTAL EQUIPMENT LISTS

Automotive Engines:

Torque wrench
3/8" square [illegible]
1/2" square drive [illegible]
Valve feeler gauge
Valve adjusting [illegible]
Tappet wrenches
Running engine [illegible]
Compression gauge
Floor jack
Axle stands
Gasket cutter
Brake bleeding hose
Brake adjusting [illegible]
Wheel cylinder clamp
Bleeder hose
Tube cutting and flaring tools
Tire removal tools
Tube repair kit and tools
Battery hydrometer
Battery pliers
Battery cable puller
[illegible]
Battery charger
Battery water [illegible]
Spark plug cleaner and tester
Condenser tester
Coil tester
Small ignition wrenches
Flat and round [illegible]
Wire brush
Soldering copper (electric)
Cam-angle tester
Timing light
Distributor tester
Breaker arm spring tension gauge
Headlight aiming [illegible]
Ohmmeter
Volt-ammeter tester
Thermometer (for thermostats)
Electric hot plate or gas furnace
Reverse flushing gun
Vacuum-pressure gauge
Tachometer
Tube bending tools
Fire extinguisher

[illegible]

- [illegible]
- Oil [illegible]
- Oil [illegible]
- Tire gauge
- Battery [illegible]
- [illegible]
- [illegible]
- [illegible]
- Spark plug [illegible]
- Inside calipers
- Outside calipers
- Chisels - [illegible]
- Dividers
- Portable electric [illegible]
- Files - [illegible]
- Screw pitch gauge
- Hammers, machinist
- Hammers, soft [illegible]
- Putty knife
- Micrometer - outside
- Pliers - [illegible], [illegible]
- Hack saw
- Screw drivers - [illegible]
- " " - Phillips [illegible]
- Adjustable open end [illegible]
- Monkey wrenches
- Pipe wrenches
- Flare nut wrenches
- Open-end wrenches
- Combination open-end and box wrenches
- Box wrenches
- Special distributor wrenches
- Fender and [illegible]
- Hood props
- Wheel chocks
- Drain pans
- Gasoline cans, safety type
- Oily waste cans, safety type
- Parts cleaning tank
- Floor creeper
- Radiator pressure cap tester

[illegible]

Exhaust pipe	[illegible]
Exhaust outlet	[illegible]
Mixing bowls	[illegible]
Air line and supply	[illegible]
Lubricating oil	[illegible]
Lubricating grease	[illegible]
Special lubricants	[illegible]
Gasket material	[illegible]
Heavy duty brake fluid	[illegible]
Penetrating oil	[illegible]
Gasket cement	[illegible]
Assorted tubing and fittings	[illegible]
Tube patches and cement	[illegible]
Storage batteries	[illegible]
Cotter pins - assorted [illegible]	[illegible]
Nuts and bolts	[illegible]
Machine screws and nuts	[illegible]

<u>Small Engines</u>

<u>Hand Tools</u>

Set open-end wrenches [illegible]
Set box-end wrenches [illegible]
Three open-end adjustable wrenches [illegible]
Set 3/8" drive 12 point sockets [illegible]
3/8" universal torque wrench
Five assorted common screwdrivers
Three assorted phillips head screwdrivers
Common pliers
Needle nose pliers
Side cutting pliers
Set of feeler gauges
Spark plug gap gauge
Point file
Set of ignition tools
Spring tension gauge
Set of flare nut wrenches
Flywheel puller
Wire brush
Putty knife
Hacksaw and blades
Files
12" pipe wrench
Three ball peen hammers
Plastic mallet
Vise

Equipment

One small 4-cycle [illegible]
Four cycle [illegible]
One cylinder [illegible]
One cylinder 2-cycle [illegible]
Two cylinder 2-cycle [illegible]
Flywheel magneto [illegible]
Tank for running outboard motors
Engine stands for outboard motors
Condenser and coil [illegible]
Dial indicator
Micrometer
Spark plug cleaner

Materials

High tension wire
Low tension wire
#20 oil
Outboard motor oil
Hypoid grease
Cam lubricant
Penetrating oil
Gasoline
Spark plugs and condensers
Gasket material
Gasket cement
Shim stock
Plastigauge
Emery cloth
Cotter keys

Additional Items for Advanced Programs

Magnet charger
Valve grinding and service equipment
Ridge reamer
Cylinder boring machine and honing equipment
Scooter
Outboard motor with electric starter
Go-Kart

[illegible]

Electrical [illegible]

Suggested list of equipment [illegible] electrical area of instruction.

The following list is suggested for a course in general [illegible] including basic electronics. [illegible] Quantity will be controlled by the [illegible] and the amount of money in the budget. [illegible] correct to purchase good materials.

*Items so indicated are necessary [illegible] possible to offer a beginning course [illegible] ...ities.

Construction Tools

Power tools as available
Sheet metal tools as available
General tools
Vises - wood and metal

Screw drivers - long shaft, light weight
Pliers - 6" electrician, long nose, diagonal cutting
Chassis punch (set)
Circle cutter
Reamer
Wire stripper
Wire gage
Lloyd knives
Scissors - paper
Shears - tin
Crescent wrench 6"
Spin tight wrench (set)
Tweezers
* Staple gun
Hand drill
Soldering iron
Soldering gun
Tap and die (set)
Fuse puller

Demonstration:

- [illegible] equipment
- [illegible] equipment
- Microammeter 50 - 0 - 50
- [illegible] on panel - [illegible]
- Cathode ray oscilloscope

Demonstration equipment must be familiar to the instructor. As a result each teacher will want to set up much of his own materials. Many devices will be taken directly from his general supplies. Teaching and demonstration devices may be constructed by the class as needed.

Experimental and measurements

Variac or Powerstat 7 1/2 Ampere, 0 - 140 Volt
D.C. Rectifier power supply 10 Ampere, 0 - 120 Volt.
Direct Current Voltmeter 0 - 15
0 - 30
0 - 150
" " Ammeter 0 - 1
0 - 5
" " Milliammeter 0 - 1
0 - 10
0 - 20
Alternating Current Voltmeter
0 - 15
0 - 30
0 - 150
0 - 300
" " Ammeter
0 - 1
0 - 5
0 - 10
Wattmeter 0 - 150 - 300 Volt
0 - 10 Ampere
Volt-Ohm-Milliammeter 20 000 Ohms per volt
Vacuum tube voltmeter
Wheatstone bridge.

[illegible]

[illegible] - [illegible]
[illegible]
Switches [illegible] (Mains and [illegible])
Relays Motor control [illegible] volt and 110 volt A.C.
Start - Stop button
Motor
  Turn table
  F.M.
  Direct current
  Induction
  Selsyn
Service entrance switch 60 amp.
Watt hour meter
4" Octagon box
Switch box
Lamp receptacle
S.P. and three way switch
Low voltage wiring transformer
Low voltage relay
Momentary push button
Code key
Buzzer High frequency
Antenna
Relay Sensitive for plate circuit
Magnetic counter
Code oscillator

Testing and Analysis (Service and Repair)

Turn table
A.M. Tuner
F.M. Tuner
Amplifier
* Intercom
* Tape recorder
Audio signal generator
R.F. signal generator
Tube checker
Photoelectric cell
Wireless oscillator
Battery charger
* Telephone
* Geiger counter
Capacitor checker
* Transistor checker
Decade resistance
Decade capacitance

Note: Much of your budget will be used up for tubes if great care is not used in their purchase. Experimental circuits and repair work will need to be well organized to prevent the expenditure of money, greater than you may have.

It will be advantageous if a local shop will sell you a needed tube as you have a need for it.

Vacuum tubes, gas tubes, transistors.

257

[illegible]

Transformers
  Filament
  Isolation
  Power supply
  Output
  [illegible]
  [illegible]
Ear phones
Speakers
Lamps
  Incandescent
  Fluorescent
  Neon
  Panel
Batteries
[illegible]
Sockets
  Lamp
  A.C.
  Tube
    7 pin
    9 pin
    metal
Transistor sockets
Fuses
Capacitors
  mica
  oil
  variable
Potentiometers
Rectifiers
Loop sticks
Diodes
[illegible]
Filter chokes

Wire
  No. 14 Building
  12 "
  14 Romex
  Ext. cord
  Test lead
  No. 20 Hook-up (solid)
  Magnet - enameled
    No. 18
    20
    22
    24
    26
Solder - wire
Flux

[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
  [illegible]
  [illegible]
  [illegible]
  [illegible]
  [illegible]
  [illegible]
  [illegible]
  Tacks
  [illegible]
[illegible]
Metal
  Sheet copper
  brass
  gal. iron
  Zinc
  [illegible]
  Band iron
Insulation
  Wood
  Ply wood
  Masonite
  Formica
  1/8" plastic
Printed circuit materials
Hardware
  Bolts, nuts, washers
    4 - 40
    6 - 32
    8 - 32
    10 - 24
    10 - 32
  Wood screws

[illegible]

1 Grinder, Bench, Delta 7"
1 Drill Press, Delta 14"
4 Machinist Vises, Columbia [illegible]
1 Box and Pan Brake, Di-Acro Spartan Model 24
1 Rollers, Di-Acro Spartan Model 18 or 24
1 Shears, Di-Acro Spartan No. 12 or 24
1 Lathe, Engine, South Bend 9" or 11"
1 Spot Welder w/control - Sure-Weld [illegible]
1 Stake, Beakhorn, Pexto [illegible]
1 Stake, Coppersmith's Square, Pexto [illegible]
1 Stake, Creasing Stake with horn, Pexto [illegible]
1 Stake Plate Stand, Pexto [illegible]

Approximate Total [illegible]

A variety of small tools such as hammers, snips, punches, etc. will also be needed.

APPENDIX I

Workshop for Industrial Arts Instructors of Blind Students

Typical Schedule of Daily Events for Blind Students

Counselor: S.F. Paradise

Day	8-9	A.M.	12-1	1-3	3-5	5-6	Evenings
Mon.	Arises 7 a.m. Breakfast	Gym Wrestling and trampoline (Joe Farmer)	Lunch	School	Travel	Dinner	Hike and stop at Dairy Bar
Tues.	"	Horseback riding	"	"	"	"	Fishing at Fair Haven
Wed.	"	Pool - swim	"	"	"	"	Trip to local places Fort Ontario
Thurs.	"	Baseball Soccer	"	"	"	"	Wash clothes Listen to ball game
Fri.	"	Hike	"	"	"	"	Movie Fort Ontario Shopping
Sat.	"	F A I R H A V E N S T A T E P A R K Fallbrook Picnic Grounds Shore Acres, Oswego College		Picnic, swim, fish			
Sun.	"	Church	"				Quiet games Cards, checkers, radio and TV

Some weekends spent at home or at Batavia, N.Y. (school)

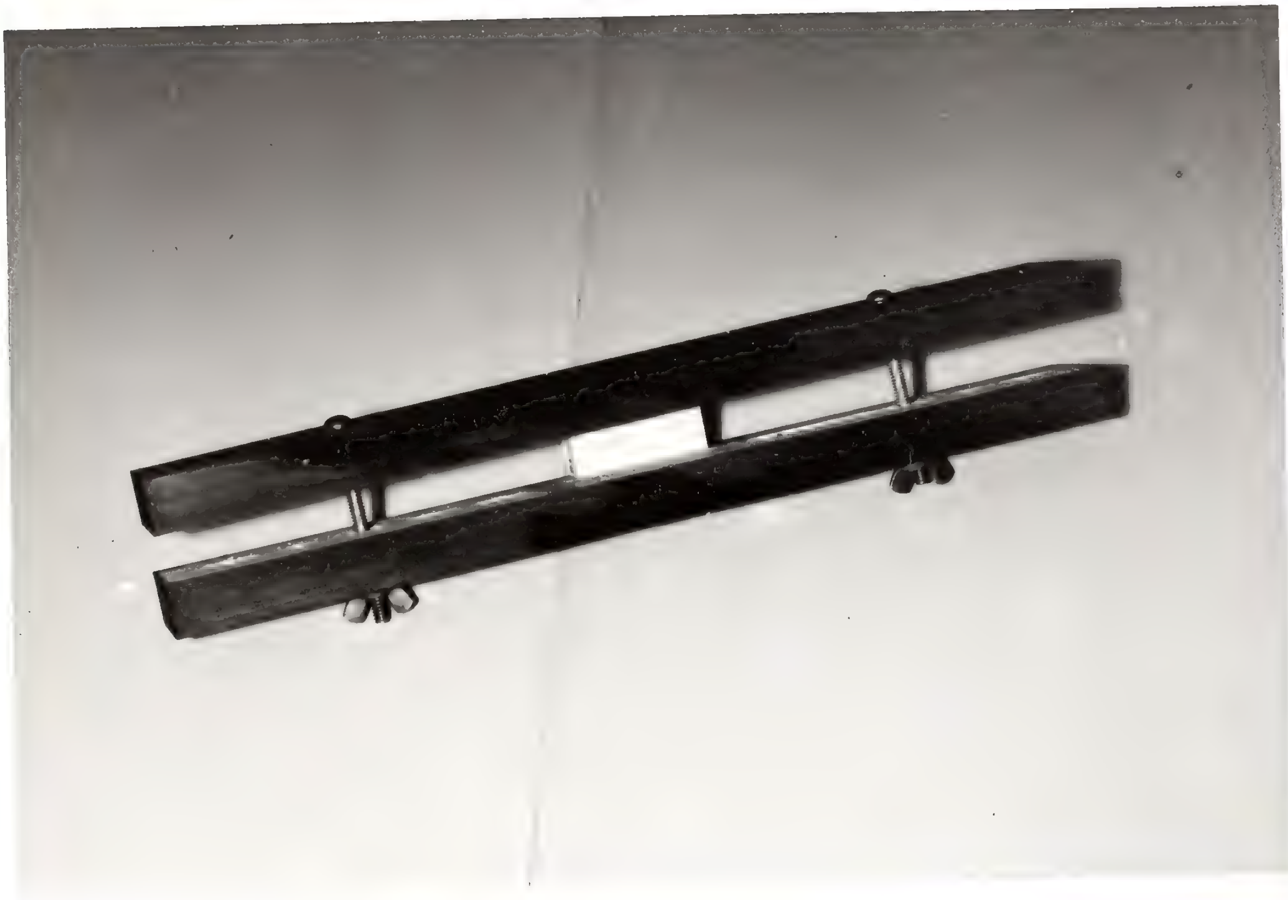
This is a representative week. There is included, when necessary, time out for letter writing, personal hygiene, talk and rest. Boys have also been invited home by personnel here at school and teachers have been invited by the boys to talk to them on some particular interest.

<u>Other Activities:</u>
1. Golf (practice in gym)
2. Golf (on course at Battle Island golf course)
3. Work on projects in I.A. shops
4. Apparatus, ring, rope work in gym
5. Swim in lake (etc.)

APPENDIX J

PHOTOGRAPHS OF TYPICAL ACTIVITIES
PERFORMED BY BLIND
HIGH SCHOOL STUDENTS


BREAKER
PTS



Graduate Stipends

The following stipends will be paid to each graduate student selected to participate in the workshop:

1. All tuition and college fees paid in full — $133
2. Transportation expenses not to exceed $200 per person.
3. Living expenses of $50.00 per week for 6 weeks — $300.
4. All cost of laboratory materials.

A Complete Summer Session Catalogue will be sent on Request

Opportunities . . . . . Cultural and Recreational

Graduate students selected for enrollment in this special workshop will have full access to a rich program of recreational activities available on the college campus and surrounding area. A varied program of sports including baseball, tennis, volleyball, hiking, swimming and bicycling is an important part of the summer activities.

The facilities of Lee Hall, the health and physical education building, include a squash court, badminton court, indoor swimming pool are available to summer session students.

Several concerts, lectures and programs of a general cultural nature will also be available to those in attendance.

Living Accommodations:

College dormitory rooms will be available to single students. Other housing addresses can be obtained from the Associate Dean of Students.

Graduate Workshop for INDUSTRIAL ARTS TEACHERS of The Blind

AT OSWEGO

July 5 — Aug. 12, 1960

STATE UNIVERSITY OF NEW YORK
COLLEGE OF EDUCATION
OSWEGO

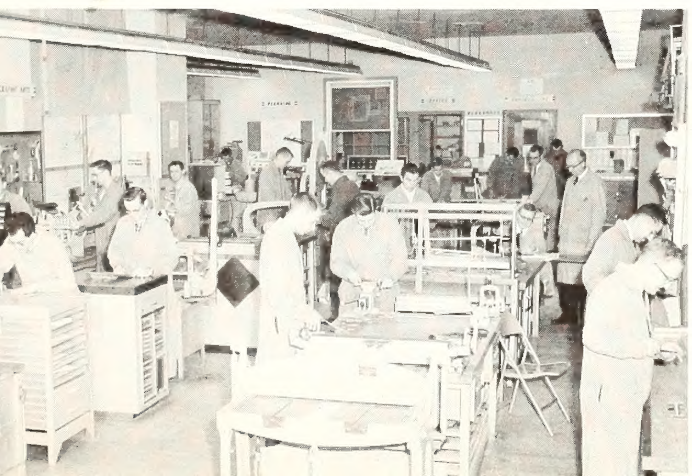
An Experimental Pilot Program Jointly Sponsored by
The American Foundation for the Blind
The Office of Health Education and Welfare
and
The American Association of Instructors of the Blind

Opportunity for Experimental Action Research

Applicants selected to participate in the workshop will have a unique opportunity to participate in the first project of this kind ever conducted. The results of the experimental studies and techniques to be tried and developed in this program can make a significant contribution toward improving this phase of education for the blind youth of the country.

Graduate students will be encouraged to delve further in those areas where they have basic preparation as well as develop new technical skills and understandings that they have not been exposed to before.

A major outcome will be the exchange and development of new ideas and techniques for teaching industrial arts activities to the blind.



The Program

This special workshop is a pilot program designed to provide the industrial arts teacher who is working with blind students an opportunity to increase his technical competence and understanding and to gain a better incite and appreciation of advanced methods and improved techniques of providing industrial arts activities for blind students. The following graduate courses and activities will be followed in this experimental workshop to accomplish the stated objectives:

I.A. Lab. 250 — *Special Education Laboratory* — Hours 8-12 a.m. — Credit 3 SH

Experiences will be provided to develop technical abilities with emphasis on wood, metal, transportation and electricity as related to the teaching of bling students.

I.A. Educ. 225 — *Experimental Special Education Activities Laboratory* — Hours 1-3 p.m. — Credit 2 SH

This course will involve blind high school students and graduate students in a special education laboratory. A laboratory school atmosphere will prevail in which the graduate students will be expected to involve the high school students in activities related to the basic areas of wood, metal, transportation and electricity. Experimental teaching procedures will be evaluated and the progress recorded for purposes of making appropriate changes and adaptations in teaching techniques and procedures.

Educ. 200 — *Foundations of Education* — Hours 3-4:30 p.m. — Credit 3 SH

A graduate course in the historical, philosophical and psychological movements in education as they influence present day educational practice. Contrasting philosophies will be examined to aid the student in clarifying his own educational philosophy and to draw implications for the teaching of industrial arts with special emphasis on teaching the blind.

Procedure . . . . . for making Application

Industrial arts teachers interested and who meet the qualifications listed below should make written application to:

Director of Summer Session and Graduate Study
State University of New York
College of Education, Oswego, New York

Written application must be accompanied by:

1. Transcript of undergraduate credit leading to a bachelors degree with a major in industrial arts education.
2. A letter from the administrative head of the school where employed, certifying that the applicant is teaching blind students in industrial arts OR that because of lack of special training, blind students have not been assigned to his industrial arts classes.
3. A statement outlining the type of work which the applicant has been carrying out with the blind students in his classes.

NOTE: Applications must be received by June 10 to be considered.

Qualifications of Teachers who may Apply

In order for an industrial art teacher to be eligible for enrollment and receive the graduate stipend the applicant must:

1. Hold a recognized bachelors degree with a major in industrial arts.
2. Have at least one blind student in his classes OR
3. Be teaching in a school enrolling blind students who are presently not permitted to take industrial arts because of a lack of special training on the part of the teacher.